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Does an oral health education program increase oral health literacy and access to dental care in a refugee population?

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Does an Oral Health Education Program Increase Oral Health Literacy and Access to Dental Care in a Refugee Population?

A Thesis

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by

Romana Muller

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Major Professor:

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MASTER'S THESIS

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MEMORANDUM

To: Romana Muller, Department of Dental Hygiene, 160 HSB

From: Sarah Keller, Chair, Institutional Review Board for Human Subjects Research

Date: January 24, 2016

Subject: Review of HS-4960 *Does an Oral Health Education Program Increase Oral Health LIteracy and Access to Dental Care in a Refugee Population*

Human subjects protocol HS-4960 *Does an Oral Health Education Program Increase Oral Health LIteracy and Access to Dental Care in a Refugee Population* has been reviewed and determined to be exempt from further review according to federal regulations for the Protection of Human Subjects under CFR Title 45, Part 46.101(b)(1-6), conditional upon the changes listed below being made and approved. Research qualifying for an exemption is valid for a period of one year, to January 24, 2017. If you wish to continue gathering data for the study after that date, you must file a Renewal of Approval application *prior to its expiration*, otherwise the project will be closed and you would need to submit a new application for IRB review if you wish to continue the research. A signed, approved copy of your application is enclosed.

Before you begin:

1. Your written recruiting letter seems to contain enough jargon and technical terms, e.g., post-test follow up, to not communicate sufficiently with a learner English speaking population. It needs to be no more than 8th grade reading (standard for consent forms) and if the subject population all speaks just one language (Czech?), in that language as well. You have all the questions, etc. translated into Czech. Do you speak Czech? Will someone else introduce the study to them who does speak Czech? It is important that the potential subjects be fully informed and have their questions answered. If they speak multiple languages then the study has to be conducted in English, but if they all speak the same native language then the administration, if not the intervention, of the study could be in that language for clarity. Please let me know about the level of English understanding that the population has and provide any revisions of the recruiting information letter that can address this issue. They need to understand clearly that they don't have to volunteer and that they can drop out at any time without explanation. They also don't have to answer any questions they prefer not to.

If subsequent to initial approval the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departures from the original proposal must be approved by the appropriate IRB review process before the protocol may be altered. A Change of Protocol application must be submitted to the IRB for any substantial change in protocol.

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Abstract

Purpose: To assess oral health literacy (OHL) of refugees in St. Louis, Missouri and evaluate the effect of an oral health education program on OHL and oral health perceptions.

Methods: The three-phase non-experimental quantitative research included a group of 52 refugees; implementation of an oral health education program and a pretest/posttest analysis of two surveys; a Socio-demographic Survey and Oral Health Perceptions of Refugees; and an Estimate of Oral Health Literacy – Bilingual 40 (EOHL-BL40).

Results: Participants scored higher on EOHL-BL40 Posttest 1 with a mean of 28.61 (SE=2.41) versus Pretest with a mean of 15.29 (SE = 1.24). Good retention of information was demonstrated. Though the score of Posttest 2 was lower than that of Posttest 1 with a mean of 25.48 (SE = 2.37) versus 28.61 (SE = 2.41), the score of Posttest 2 was significantly higher than the Pretest. The OHL assessment in native language was significantly higher with a mean of 18.92 (47.31%) compared to English assessment with a mean score of 6.12 (15.29%).

Conclusion: Oral health education programs are effective at improving OHL and oral health perceptions of refugees. Bilingual word comprehension is effective at assessing OHL of refugees.

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Introduction/Literature Review

Introduction to the Research Question

Current research reports a link between general health and health literacy (HL). According to the Institute of Medicine (IOM), HL is "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (IOM, 2004, p. 20). As defined by the American Dental Association (2013), low HL is "one's limited capacity to obtain, comprehend and act on health information" (IOM, 2004, p.178) resulting in inappropriate utilization of health services, high emergency room rates, underuse of preventive services and inadequate comprehension of postoperative instructions (IOM, 2004; Atchison, Gironda, Messadi & Der-Martirosian, 2010). Those affected are more likely to have poor general health and lack of access to healthcare services. Low HL not only affects patients, but also their families, who are depending on their ability to navigate the healthcare system (Horowitz, 2013). According to the 2003 National Assessment of Adult Literacy Survey, 43% of Americans have low HL (Kutner, Greenberg, Jin & Paulsen, 2006). The 2010 *National Action Plan to Improve Health Literacy* identified racial, ethnic, refugee and immigrant groups as the most likely to experience limited HL (United States Department of Health and Human Services [HHS], National Action Plan to Improve Health Literacy, 2010).

Geltman et al. (2013) found a correlation between low HL and declining quality of oral health. A study conducted by IOM entitled *Advancing Oral Health in America* concluded that oral health literacy of the U.S. population is low (IOM, 2011). Oral health

literacy (OHL) is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic oral and craniofacial health information and services needed to make appropriate health decisions" (IOM, 2013. *Oral Health Literacy: Workshop summary.* p.11). According to the report, low OHL affects communities as well as health care providers. Persons with low OHL have a poor understanding of the oral-systemic link, struggle to prevent and manage dental diseases, and do not know the best communication techniques for navigating the oral health care system (IOM, 2013). As a response to the Surgeon General's Call to Action, health and oral health professionals are expected to lead the national effort in bringing change through design, application and implementation of culturally appropriate programs. The refugee population is especially vulnerable (HHS, 2003) to the myriad problems associated with low OHL. The purpose of this research is to investigate whether an intervention of an oral health education program increases oral health literacy (OHL) and utilization of dental services within a refugee population.

Statement of Problem

Poor OHL negatively affects the dental and systemic health of many Americans. OHL is closely linked to HL (Geltman et al., 2013). Approximately half of the population lacks adequate HL (Atchison, Gironda, Messadi & Der-Martirosian, 2010). The 2003 Surgeon General's *Call to Action to Promote Oral Health in America* emphasized the importance of OHL for improved access to dental care (HHS, 2003). According to the 2000 Surgeon General's Report on Oral Health, in order to increase the nation's capacity to improve oral health and reduce health disparities, dental professionals must strive to enhance the public's understanding of the meaning of oral

health and its connection to the rest of the body. This message needs to take into account multiple languages and cultural traditions of diverse populations (HHS, Surgeon General's Report, 2000c).

In the 2011 report, the IOM and the National Research Council (NRC) identified low levels of OHL among the U.S. population as one of the barriers to accessing oral health services. Non-English speakers were identified as one of the populations most affected by low access to care (IOM & NRC, 2011). Professionals who work closely with these groups, such as caseworkers, recognize linguistic and cultural barriers to care. Substantial changes need to be made in the way health related information is delivered to the refugee and immigrant communities. Collaboration between healthcare professionals and institutions that assist with the integration of these groups into the community has shown to be beneficial (Burgess, 2004).

This study explored the impact of an oral health educational program on OHL of refugees and their perceptions of oral health as a contributing factor to systemic health. The primary investigator (PI) predicted the program would increase OHL of participants, improve the perceptions of oral health, promote a better understanding of dental disease, and highlight the importance of preventive and therapeutic interventions. The results of the study demonstrated that by developing a culturally appropriate oral health education program, oral health care providers could contribute to increasing OHL of refugees, with the potential to ultimately improve their access to dental care.

The research addressed the following questions:

1. Will the OHL of the refugee population in an English as Second Language (ESL) class taught at the International Institute of St. Louis increase with delivery of an oral health education program?
2. Will the refugee population demonstrate long-term retention of information learned in the oral health education class?
3. Will the refugee population place greater value on dental care, disease prevention, the oral-systemic link, and oral health education?

Overview of Research

Health Literacy. Health literacy (HL) is "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (IOM, 2004, p. 20). The level of HL varies by race, ethnicity, level of education, and poverty level. Health outcomes, healthcare cost, quality of care and life are impacted by HL. The first assessment of HL among adults found that nearly 80 million Americans are not able to understand simple, health-related information (National Assessment of Adult Literacy [NAOAL], 2003). HL is dependent on the communication skills of patients and providers (Horowitz, 2013). Adequate communication skills and navigation of the healthcare system is also important for caregivers. For parents, it is important to understand medical concepts and participate in healthcare of their children. If the parent's HL is low, the children's health is negatively affected (Horowitz, 2013).

Adequate level of HL is required in order to access and navigate the healthcare system, to understand and complete forms, to articulate symptoms, and to know when

and how to ask questions and communicate with providers. Results of national surveys suggest that half of the US adult population has low HL. In addition, the average American reads below the skill level needed for comprehension of health related materials; this places the reading skill level of average American at, or below, sixth grade (Nielsen-Bohlman, Panzer & Kindig, 2004; Kutner, Greenberg, Jin & Paulsen, 2006; Deane, 2004).

The impact of low HL on the general health of the population is evident and includes:

- treatment and medication errors (Baker et al., 2002)
- increased rates of disease, hospitalization and mortality (DeWalt, Dilling, Rosenthal & Pignone, 2007; Lenton & Ridpath, 2012; Baker, Parker, Williams & Clark, 1998; Baker, Wolf, Feonglass & Thompson, 2008; Baker et al., 2002; Kutner et al., 2006)
- lack of preventive care and disease management (Kutner et al., 2006; DeWalt et al., 2007; Schillinger et al., 2002; Baker et al., 2002)
- increased use of emergency rooms (Kutner et al., 2006)
- increased healthcare costs by $100-$238 billion (Vernon, Trujilo, Rosenbaum & DeBuono, 2007).

Oral Health Literacy. Health literacy and OHL are closely linked. Low OHL of patients has a negative effect on oral health and access to dental care (Atchison et al., 2010; Horowitz, 2013; Geltman et al., 2013; IOM, 2011). The populations mostly affected by low OHL are older adults, individuals with limited education, populations living in poverty, minority populations, and individuals with limited English proficiency

(LEP). The 2000 Surgeon General's report on Oral Health in America summarized the current oral health status of the U.S. population and identified opportunities for improvement. The report cited the public's lack of awareness about the importance of oral health as one of the contributing factors to poor oral health (HHS, 2000c). Part four of the report defines the role of dental personnel in increasing OHL of patients and calls for action in delivering oral health care to vulnerable populations such as minority groups (HHS, 2000c).

As oral health professionals encounter increasingly diverse communities of patients, they may have to look to a variety of techniques to assist with communication issues. Inadequate OHL among refugees is one of the major barriers to dental care (HHS, *National Call to Action*, 2003). In fact, disparities in OHL among refugees can be attributed to many factors. It is a complex issue that is tied to cultural and socio-demographic characteristics including lack of dental health education in the native countries and the existence of non-traditional oral health practices and beliefs. Current research suggests that resettlement programs for refugees should include dental services and educational programs in order to prevent further decline in oral health in this population (Willis & Bothun, 2011).

Oral health education abroad is limited at best. Most refugees have never seen a dentist before coming to the United States (Rwamugira & Maree, 2012). Communication with refugees can be difficult and often requires the use of translators, which is a costly endeavor. In most states, Medicaid does not routinely cover interpreter services, although there are exceptions, such as the State Children's Health Insurance Program (SCHIP) (Medicaid.gov, 2014). Even though Title VI of the Civil Rights Act obligates medical

caregivers and federally funded dental schools to provide interpreters for ESL patients, the language barrier continues to be a problem (Ku & Flores, 2005).

Health literacy has been the focus of various institutional efforts aimed at improving the general health of the population through increased HL (HHS, 2000b; HHS, 2010; ADA, 2015b). One of those organizations is the U.S. Department of Health and Human Services, which noted improved OHL as one of the goals of Healthy People 2010. The publication called for increased HL among individuals with marginal literacy skills and improved health communication skills of providers. According to the report, "closing the gap in health literacy is an issue of fundamental fairness and equity and is essential to reduce health disparities" (HHS, Healthy People 2010: Understanding and Improving Health, 2000, p. 11-15).

Furthermore, the HHS (2000a) report stated the following:

> To promote oral health and prevent oral diseases, oral health literacy among all groups is necessary. In addition, oral health services—preventive and restorative—should be available, accessible, and acceptable to all persons in the United States. In areas where different languages, culture, and health care beliefs would otherwise be barriers to care, a cadre of clinically and culturally competent providers must be available to provide care. (p. 21-6).

The HHS (2000a) report also highlights the impact of cultural diversity of dental providers as it plays an important role in oral HL of culturally and ethnically diverse populations. The report states, "Public education campaigns must be conceptualized and developed by individuals with specific knowledge of the cultural characteristics, media habits and language preferences of specific intended audiences" (HHS, 2000a, p. 11-6).

In the HHS (2003) report on promoting oral health, the Surgeon General challenged healthcare providers to work with local and state representatives on developing strategies that would help change the public's current opinion of oral health in relation to general health. In order to raise the appreciation of oral health as an essential component of total body wellness, specific changes will have to occur at various levels, ultimately improving oral health perceptions of the public, policy makers and healthcare providers.

To improve public's perceptions, stakeholders should collaborate to:

- enhance oral health literacy
- deliver messages that are culturally sensitive and linguistically competent
- enhance knowledge of the value of regular, professional oral health care
- increase the understanding of how the signs and symptoms of oral infections can indicate general health status and act as markers for other diseases.

To improve the OH perceptions of policy-makers, stakeholders should use data to:

- inform policymakers and administrators at local, state, and federal levels of the results of oral health research and programs and of the oral health status of their constituencies
- develop concise and relevant messages for policymakers
- document the health and quality-of-life outcomes that result from the inclusion (or exclusion) of oral health services in programs and reimbursement schedules (page 8).

The HHS (2003) report also states that oral health providers should change own perceptions of their role in oral health of the public. This could be done by seeking opportunities for professional growth and engaging in interprofessional collaboration by:

- reviewing and updating health professional educational curricula and continuing education courses to include content on oral health and the associations between oral health and general health
- training health care providers to conduct oral screenings as part of routine physical examinations and make appropriate referrals
- promoting interdisciplinary training of medical and oral health, and allied health professional personnel in counseling patients about how to reduce risk factors common to oral and general health
- encouraging oral health providers to refer patients to other health specialists as warranted by examinations and history
- encouraging medical and surgical providers to refer patients for oral health care when medical or surgical treatments that may have an impact on oral health are planned (p. 8).

As indicated above, the first step in implementation of these strategies is to promote a national movement towards increasing oral HL of the public. In order to design effective oral health education programs, it is important to identify the knowledge, opinions, and practices of the population (HHS, *National Call to Action*, 2003).

As stated in the goals of Healthy People 2020, health literacy, health communication, and health informatics continues to be among the leading priorities for improvement of the health of the U.S. population (HHS, 2014). However, it has been

previously shown that efforts to improve the quality of care, to reduce costs and to reduce oral health disparities cannot succeed without simultaneous improvements in the HL of the public, health care providers and policy makers (Horowitz, 2013).

Oral Health Literacy Assessment. It is difficult to assess HL accurately across all segments of the US population. Thus far, several instruments have shown to be marginally effective in this effort. These include the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA). REAM is a word recognition/reading test, while TOFHLA is a comprehension test consisting partly of a reading comprehension and partly of a numerical section, which tests patient's ability to read prescriptions (Parker, Misan, Chong, Mills, Roberts-Thomson, Horowitz & Jamieson, 2012). The limitations of these instruments are that they do not assess an individual's ability to read, comprehend and navigate health-related language and materials, nor do they identify cultural differences in individual approaches to health related issues (Horowitz, 2013). A combined assessment of oral HL using study instruments, such as bilingual word recognition tests, may address some study limitations. Inclusion of practical applications of terms and consideration of traditional practices and beliefs related to oral health should be incorporated (Parker et al., 2014, Tadakamadla et al., 2014; Junkes et al., 2015).

Level of HL can, in some cases, predict oral health status of an individual. A study conducted by Geltman et al. (2013) demonstrated the correlation between low HL and the declining tendency of oral health in a refugee population. The data suggested that factors, other than low OHL, may play a role in poor oral health. Among these were

acculturation, length of time in the U.S., and adoption of a western diet, leading to increased consumption of refined sugars (Geltman et al., 2013).

Oral health literacy assessment is a fairly new phenomenon in dentistry. The challenge for dental professionals is to enhance the existing assessment tools, such as word comprehension and recognition tests. Thus far, the most commonly used word-comprehension tests in dentistry include the Test of Functional Health Literacy in Dentistry (TOHFLiD) and the Oral Health Literacy Instrument (OHLI). While measuring several aspects of OHL, the administration takes between 20 to 30 minutes, which makes word-comprehension tests unsuitable for a fast paced office environment (Parker, Baker, Williams & Nurss, 1995; Gong, Lee, Rozier, Pahel, Richman & Vann, 2007; Sabbahi, Lawrence, Limeback & Rootman, 2009; Parker et al., 2012; Khan et al., 2014). The REALD-30 word- recognition test is frequently used in dentistry. It contains a list of 30 dental words arranged in order of increasing difficulty. It was modeled after similar test used in medicine, the REALM. Subjects are asked to read the list of words and are evaluated on pronunciation by gaining a point for every word correctly pronounced (Lee et al., 2007). Some argue that tests such as the REALD-30 only evaluate the person's reading skills and may not reveal the person's true OHL level (Arora, Liu, Chan & Schwarz, 2012; Parker, et al., 2012; Khan et al., 2014).

In a 2014 study, Khan and colleagues combined a REALD-30 word recognition test with a REALD- 30 comprehension assessment, and have found a significant difference in the outcomes. Participants (N=150) were asked to read the words on the test out loud and then explain their meaning. The results showed higher scores on the

REALD-30 word recognition with a mean of 22.98 (SD = 5.1) compared to REALD-30 comprehension with a mean of 16.1 (SD = 4.3).

The instruments developed and effectively used to evaluate OHL among groups in the U.S. population have been designed only for English or, rarely, Spanish speaking patients, with few exceptions. Non-English speakers are often excluded from studies (Lee et al., 2011).

Writing an OHL assessment test both in English and in the native tongue of the refugees or immigrants could be useful in identifying the gaps in OHL between the two languages. Including a comprehension component may make a difference in the quality of OHL assessment. While a bilingual patient may not recognize and understand a dental term in English, they may know it well when presented with the translated version. Over time, translated versions of REALD-30 test have shown good internal reliability, validity and reproducibility in various cultures (Lee et al., 2011; Parker et al., 2012; Tadakamadla et al., 2014; Junkes et al, 2015).

Oral Health Education Programs. In response to the growing need for oral health education programs targeting immigrants, a number of programs have been developed in the US (Brown, Canham & Currenton, 2005; Mancuso, 2011; Farokhi et al., 2014). Research data on this topic can also be found abroad, as many countries deal with similar issues of assimilating immigrant or refugee communities into the healthcare system and implementing educational programs for diverse groups (Arora et al., 2012; Parker, Misan, Mills, Roberts, Horowitz & Jamieson, 2012; Kumar et al., 2011). Brown et al. (2005) examined the effects of oral health education program on OHL of Latino immigrant parents administered by a non-Hispanic school nurse. A pretest/posttest

questionnaire was administered to the participants to assess changes in OHL after the administration of the oral health education program. The results of the study indicated that a multifactorial approach, one addressing OHL of children and one educating the parents, most effectively decreases oral health disparities among immigrant children (Brown et al., 2005). A study conducted in Poland between 1995 and 2000 utilized self-administrated questionnaires to analyze the oral health (OH) behaviors of school aged children *(N*=19506) and mothers (*N*=1040). The data compared the oral health education of mothers to the dental care habits of their children. A positive correlation was found between the OHL of mothers and the oral health habits of their children, further supporting the importance of educating parents in order to achieve better oral health for their children (Wierzbicka, Petersen, Szatko, Dybizbanska and Kalo, 2012).

When implementing oral health care programs that include multiple cultures, it is important to build on existing resources such as those provided by the World Health Organization (WHO). One example of a publication that can be downloaded for free from the WHO website is "*Health Surveys – Basic Methods*". The manual contains oral health information and surveys appropriate for intervention from a global perspective (WHO, 2015).

Every group of refugees brings with them traditional beliefs and knowledge about oral health care practices based on the care provided in their country of origin. Prior experiences may present barriers to care in an unfamiliar healthcare system that may be significant and difficult for health providers to overcome. The involvement of individuals from ethnically diverse communities in the oral health care of refugees can often make a positive difference in the effectiveness of a program. Several studies show community

involvement as a major contributing factor to the success of oral health programs (Ogungbenro, Mickenautch & Rudolph, 2000; Manusco, 2011).

The WHO identified dental caries and periodontal disease as one of the major global health problems (WHO, 2015). Access to oral health care is very limited in many developing countries. Unfortunately, oral health care of refugees has been neglected in the past. Recently, oral health programs are considered an important part of health services in refugee communities (Ogungbenro et al., 2000). In the report on oral health of refugees in Ghana, Ogungbenro et al (2000) described a successful oral health program administered in a Liberian Gomoa Buduburam refugee camp where refugees themselves reported lack of oral health care services as a major problem, especially among children. The study examined the implications of the program based on Primary Health Care Approach (PHCA) and promoted involvement of community members in the delivery of oral health services and oral health education. PHCA is a model adopted by the WHO and includes five key elements to achieve better health of a community. Those elements include promotion of universal coverage, culturally adequate service delivery, health promotion, pursuing collaborative models and maximizing stakeholder participation (WHO, 2015). Twelve refugees were selected to train as Community Oral Health Workers (COHW) using WHO training modules. These workers delivered most of the primary oral health care in the camp. Ninety percent of restorative care was provided using the Atraumatic Restorative Treatment (ART) approach that consists of caries removal with hand instruments only, and the use of adhesive filling materials such as glass ionomer as a final restoration. The COHW organized educational activities and utilized several channels to communicate with the refugees, such as linking oral health

promotion to sports, using food to bring attention to oral health issues and their relevance to the community, visiting homes to educate families about proper home care and other health related issues. Because the COHW came from the same community that they served, it was easier to establish rapport and trust between them and their patients (Ogungbenro et al., 2000).

Manusco (2011) described the development of a HL program for Indonesian immigrants and highlighted the importance of collaboration between healthcare providers and cultural community leaders. Indonesians have difficulties with communicating their wishes, opposing authority, and trusting healthcare providers, all of which place additional barriers on communication. The engagement of a local pastor, who was a member of the Indonesian community and who was knowledgeable about traditional beliefs and practices, contributed to the success of the program. Through a network of 12 Indonesian pastors, information about the HL program reached 2500 Indonesian asylum seekers. The community expressed interest in having a pastor act as a healthcare liaison. The partnership between the pastors and healthcare professionals led to creation of a culturally appropriate medication safety program, health fair and ongoing HL promotion efforts. A total of 90 *(N* = 90) participants attended the events and gave positive feedback on their evaluation forms.

Acculturation can be defined as "a culture learning process experienced by individuals who are exposed to a new culture or ethnic group" (Organista, Marin and Chun, 2010, p. 102). For instance, Geltman et al. (2013) studied refugees in the U.S. and found that factors such as acculturation and coverage of dental services have an effect on oral health. Specifically, Geltman et al. examined the effects of changes in diet once the

refugees arrive to the United States. For example, the traditional diet of Somalis is low in refined sugars. In addition, some regions of East Africa have a high level of naturally occurring fluoride. Both of these factors contribute to dental health. Once refugees adopt a Western diet high in refined sugars, the prevalence of dental disease increases. However, according to Geltman et al. (2013), those refugees with high acculturation showed lower incidence of dental caries because these individuals had access to oral health education and knew the link between cariogenic diet and poor oral health.

On the other hand, moderately acculturated individuals were at a higher risk of poor oral health because they adopted a western diet rich in simple sugars and carbohydrate without simultaneously adopting preventive practices. It is, therefore, critical to educate refugees on the risk of dental disease related to a change in diet and on the importance of proper oral hygiene to prevent disease (Geltman et al., 2013).

Research suggests creativity and innovation cannot be underestimated when developing educational programs. For example, Kumar et al. (2011) explored the effectiveness of an audio CD on educating patients of South Asian origin (N=15) about the treatment and management of rheumatoid arthritis. The presentation was recorded in a bilingual format that proved to be a successful approach for delivering information to a difficult-to-reach community. Many of the patients could not read in their own language and had different beliefs about treatment of their disease, which further complicated the matter. As a result of this study, not only have patients learned valuable information about their disease through an audio CD, but they have also expressed interest in being more involved in the management of their disease.

Parker et al. (2012) published a two–year study that utilized a workshop approach to increase OHL among Indigenous Australians (*N*=400), who show higher rates of tooth loss compared to non-Indigenous Australians. The workshops included oral health assessment as well as five sessions of hands-on educational activities, group discussions, and role-playing delivered over a 12-month period. Data was collected through self-report questionnaires administered at baseline, 12-month, and 24-month intervals. In the pilot study, REALD-30 was used to measure oral health literacy. However, for the actual study, the Health Literacy Management Scale (HeLM) was deemed more culturally appropriate and was, therefore, the measure that was used. One of the complaints received from the participants of the pilot study about the REALD-30, was that it felt like they were being tested. The constant awareness of being tested or watched during participation in research is known as the Hawthorne Effect. Some researchers believe the effect may be the source of profound bias. However, the theory is controversial as it is difficult to identify a single cause of specific behaviors (McCambridge, Witton & Elbourne, 2014).

Additional Barriers to Education and Dental Care Among Refugees. It is important to understand that factors other than low OHL may affect oral health status of refugees. In order to answer the question of oral health care access, one must also ask what other barriers prevent access to dental care for this population. Researching traditional beliefs and practices of ethnic minorities may prove beneficial in providing essential information which could lead to the development of culturally appropriate services.

As the United States becomes increasingly diverse, healthcare facilities face challenges treating patients whose English language skills are limited or nonexistent. Furthermore, patients from different cultures present with challenges that are unique to their group (Burgess, 2004). Research shows that not all methods of communication are effective at delivering oral education to diverse populations. Arora et al. (2012) explored OHL of Chinese mothers (N =27) and their acceptance of publically distributed dental health education materials. The mothers had a strong preference for the leaflets written in Chinese because they could relate better to the material. However, the low quality of the translation, the lack of reference to Chinese culture and the culturally inappropriate advice were some of the reasons why the pamphlets were not successful (Aurora et al., 2012).

Title VI of the Civil Rights Act of 1964 mandates that any institution receiving federal funds must make interpreter services available to limited English proficiency (LEP) individuals at no cost. Executive order 13166, titled "Improving access to persons with limited proficiency", provides guidance for institutions that must comply with Title VI, in terms of verbal and written communication services (Itaya et al., 2009; DOJ, 2016). Federal Office of Civil Rights (OCR) enforces the compliance of these regulations. In 2001, the U.S. HHS, Office of Minority Health, developed standards for culturally and linguistically appropriate services. According to the document, federally qualified healthcare centers (FQHC) must provide interpreter services at no cost to LEP patients. Interpretation services are costly. For example, the International Institute of St. Louis (IISTL) charges an hourly fee of $70 for an interpreter or for the translation fee per page (IISTL, 2015). Covering the interpretation and translation services is an ongoing

problem for FQHCs, which is required to assist with translation. Some federally funded dental schools, which are unable to charge patients for interpreter services directly, are also required to provide assistance with communication (DOJ, 2015; Burgess, 2004). Only 12 states and the District of Columbia cover interpreter services through Medicaid and State Children's Health Education Program (SCHIP). Federally qualified healthcare centers (FQHCs), including dental clinics, can add cost for interpreter services to their cost structure. It is later recovered through the negotiated per-visit reimbursement rate. Only a few select health plans in some states are required by law to pay for interpreter services for their limited English speaking enrollees (Itaya et al., 2009). Bilingual staff is an acceptable option, as are call-in interpreters. Family members, other than children, can also act as interpreters. Unfortunately, amateur interpreters may not understand how to navigate the healthcare system themselves or they may not understand specific medical terminology, which may result in misinterpretation and miscommunication between the healthcare provider and the patient (Poon, 2004).

Executive order 13166 of the Title VI of the Civil Rights Act of 1964 also mandates that federally public clinics display multilingual signage and inform patients of available assistance. Patient's preferred language must be noted in the chart (hhs.gov, 2001, DOJ, 2015).In addition, it has been shown that half of the U.S. population falls at or below a reading level of 6th grade. Therefore, all written materials must consider patient's literacy skills (Itaya, Glassman, Gregorczyk & Bailit, 2009).

Healthy People 2010 list fear of dental visits as one of the barriers to dental care (HHS, *Healthy People 2010*, 2000a). Among some groups of refugees, the fear is related to previous experiences, such as torture. A study conducted at the Boston Center for

Refugee Health and Human Rights (Singh et al., 2008) showed the challenges of treating refugees who were torture survivors (*N*=216). This study found 76% of the refugees had untreated decay and 90% required immediate care, which was hindered by fear. Torture victims panicked when placed in a supine position or when confronted with sharp objects (Singh et al, 2008).In addition, a study conducted in Ibadan, South West Nigeria revealed that fear of HIV transmission was a major barrier to dental care (Ajai & Arigbede, 2012). An interdisciplinary approach involving healthcare professionals and caseworkers has proven beneficial in providing care to victims of trauma (Quiriga & Berthold, 2004). Specifically, torture treatment centers provide appropriate care that includes treatment by dental professionals who have been educated on the sensitive needs of this population (Singh et al, 2008).

After first arriving in the United States, refugees and asylees cannot afford to pay for necessary dental services because of limited income and lack of insurance. Some refugees struggle with severe, complex and painful dental problems. Many have spent years in refugee camps where there is a lack of access to basic dental care. Refugees arrive in need of expensive dental procedures including root canals, complicated surgical extractions, and periodontal treatments. Without dental care, refugees' risk of severe pain and infection which may harm their mental and physical well-being, continues. Poor oral health can also limit a refugees' ability to obtain and maintain employment (rescue.org, 2016). Though the lack of Medicaid coverage for dental services contributes to the disparity, low OHL can diminish the desire to seek care, even if the individual is covered by insurance. In many cultures, dental disease, oral pain and tooth loss may be associated with aging. Such barriers may be eliminated with culturally appropriate

educational programs and customized care. As indicated in the Healthy People 2010 report, culturally and ethnically diverse communities benefit from receiving dental care and education from culturally competent providers (HHS, 2000a).

The 2000 Surgeon General's Report, *Oral Health in America* addresses the lack of racial and ethnic diversity in the oral health work force. In order to improve oral health education in diverse communities, there needs to be an increase in cultural competence of dental professionals and an increasingly diverse workforce as well as integration of services provided by the community (HHS, 2000c; Magee et al., 2004). The 2011 *Environmental Scan Report,* commissioned by the ADHA, suggested that diversity and cultural competence of oral healthcare providers would need to improve in order to serve increasingly diverse communities (ADHA, 2011).

According to a Medical Expenditure Panel Survey (MEPS) (MEPS, 2014), nearly half of the Hispanic participants (*N*=4200) felt their healthcare providers were not good listeners, were not communicating effectively, did not show respect and did not spend enough time to explain findings (MEPS, 2014; Cohen, 1997). Cultural understanding of providers is critical for delivering quality care to diverse communities because it improves the communication and rapport with patients of racially and ethnically diverse groups (Horowitz, 2013). In some cases, providers who are recruited from diverse communities help break down cross cultural and financial barriers. Doctors Bunnag and Musmar, who were once new immigrants themselves, are currently partnering with the Suburban Washington Resettlement Center (SWRC) to provide pro-bono dental services for refugees and asylees. Their generosity is easing some of the oral health challenges faced by immigrants after arriving in the U.S. (rescue.org, 2016).

Cultural competence in dental and dental hygiene education. Cross et al., (1989) defined cultural competence (CC) as "systems, agencies, and practitioners with the capacity to respond to the unique needs of populations whose cultures are different than that which might be called 'dominant' or 'mainstream' American" (Cross, Bazron, Dennis & Isaac, 1989, p.3). More recent studies refer to CC as an understanding of social and cultural influences on a patient's behaviors and beliefs, considering these factors in healthcare delivery systems, and implementing healthcare programs in diverse populations (Garcia, Cadoret & Henshaw, 2008).

In its policy manual, the American Dental Hygienists Association (ADHA) defines cultural competence as "awareness of cultural differences among all populations, respect of those differences and application of that knowledge to professional practice" (ADHA, 2015a, p.35). The organization advocates promotion of oral health literacy, cultural and linguistic competence, and development of educational programs for at –risk populations (ADHA, 2015a). The inclusion of diversity and CC in the dental hygiene profession has been a long-standing focus of ADHA. During the Annual American Dental Education Association (ADEA) session in 1997, the ADHA participated in the Dental Hygiene Education Program development and was instrumental in the drafting of core competencies for entry into the dental hygiene profession. These included a) promotion of dental hygiene through service activities and affiliations with professional organizations (C-7) and b) effective communication with individuals and groups from diverse populations (C-9) (ADEA, 2004).

In 2010, the American Dental Education Association (ADEA) and the American Dental Hygienists' Association (ADHA) collaborated on the development of graduate

competencies for the dental hygiene profession with focus on diversity, social and cultural sensitivity (ADHA, 2012).

As stated in the competencies, the graduates must:

> Recognize the impact of health status and ability, age, gender, ethnicity, social, economic, and cultural factors on health and disease, health beliefs and attitudes, health literacy and the determinants of health. Model cultural sensitivity in all professional endeavors. Identify the needs of vulnerable populations and communities to prevent and control oral diseases. And reduce health disparities by developing programs and strategies responsive to the diverse cultural and ethnic values and traditions of the communities served (ADHA, 2012, p. 4).

As a part of its efforts to promote the highest standards for dental hygiene education, the ADHA participated in facilitation of a pilot project focused on creating changes within curricula and learning domains of dental hygiene education programs. One of the new domains, as defined by ADHA pilot group participants, includes interpersonal communication and interprofessional collaboration. As stated in ADHA's 2015 White Paper on Transforming Dental Hygiene Education and the Profession for the 21st Century, the competencies for dental hygienists should include linguistic and cultural competence skills (ADHA, 2015b).

The American Dental Hygienists Association continues to lead the evolution of the profession as it faces new challenges that come with the changing demographics of the U.S. population. Most recently, the ADHA commissioned an environmental scan to help explore the future of oral health and the role of dental hygienists in the delivery of care. According to the report, the profession must improve the diversity of providers and

increase education on culturally competent care in order to take advantage of future opportunities in the field (ADHA, 2011).

Cultural competence is also addressed with the Commission on Dental Accreditation (CODA), which published standards for dental and dental hygiene education programs (CODA: Accreditation Standards for dental education programs [2010]; CODA: Accreditation Standards for dental hygiene education programs [2013]). Both documents mention cultural competence. Standard 2-15 of Accreditation Standards for dental hygiene education programs states "dental hygiene graduates must be competent in interpersonal and communication skills to effectively interact with diverse population groups" (CODA 2013 Standards 2-15, page 24 of dental hygiene standards).

Research shows that dental hygiene students who are able to adapt cross-culturally may demonstrate higher success of long-term treatment and better rapport with multicultural patients. Dental hygiene programs should consider multi-cultural resources, technological and global communication to provide students ample opportunities for achieving cultural adaptability (Magee, Darby, Connolly & Thompson, 2004).

The standards for dental education related to the cultural competence of dental students reflect the CODA principles regarding the importance of diversity in the environmental framework of dental schools. Dental students are required to demonstrate cultural competence and an understanding of the relationship between diversity of culture, values, beliefs, behaviors, language and patient needs. Furthermore, the structural diversity of dental school should focus on the numerical distribution of students, faculty and staff from diverse backgrounds (CODA, 2010, page 17). A 2013 report on critical trends affecting the future of dentistry indicated a slight increase of students from

underrepresented minorities (URM) than in the prior 10 years. The percentage of URM dental students changed from 11 % in 2000 to 13 % in 2011 (Diringer, Phipps & Carsel, 2013).

The lack of diversity also affects dental school faculty. The faculty delivering cultural competency training is primarily white and female (Rowland, Bean, & Casamassimo, 2006). Diversity among staff members could be increased with programs such as the Minority Dental Faculty Development Program proposed by the American Education Association (ADEA) in 2004. The goal of the study was to developed strategies on recruiting, retaining and developing dental faculty members from underrepresented minorities through focused coaching and mentoring. The study yielded a comprehensive model that could be used by other schools for faculty mentoring programs (Sinkford, West, Weaver & Valachovic, 2009).

The Standard 2-16 of Accreditation Standards for dental education programs states that dental school graduates must be competent in managing a diverse population and have the interest and communication skills to function successfully in a multicultural work environment (CODA, 2010, page 27). In order to increase cultural sensitivity among dental students, curriculum adjustment is required to include studies of cultural diversity. A study conducted by Rowland et al. (2006) investigated the status and strategies of cultural competency education in U.S. dental schools. The findings suggested that the majority of programs incorporate cultural competency topics into the curriculum. According to the Associate Deans of 56 dental schools who responded to the survey, most programs do not offer stand-alone courses in cultural competency nor do they require the faculty to have cultural diversity training (Rowland et al., 2006).

To increase cultural competency of dental students, faculty members face the challenges of developing innovative ways to include cultural competence coursework in the curriculum. An example of an effective cultural competency training program is the "Refugee Health and Cultural Awareness Training Program" which is aimed at increasing cultural awareness of students while providing preventive and primary health care services to refugees. It is a unique collaboration between the University of Buffalo's School of Medicine and Biomedical Sciences, the International Institute of Buffalo and local health centers (University of Buffalo, 2016). The program includes orientation with the dental students on the demographics of the refugees presented by staff from the resettlement agency, a cultural/medical anthropologist and a caseworker. This prepares the students for culturally appropriate interactions with their patients that begin in the clinic where they have a chance to practice listening and interviewing skills. Interpreters, resettlement experts and other professionals accompany the students while they perform physical examination. A de-briefing session follows the clinical experience where students can talk about their experiences (Shogan, 2004).

Goals for students who are enrolled in the Refugee Health and Cultural Awareness Program include:

- self-awareness regarding one's own ethnicity/culture
- understanding and appreciation for cultural diversity in the health care setting
- enhanced communication skills, including the ability to utilize interpretive services
- skills for establishing collaborative partnerships between providers and patients

- increased cultural sensitivity and competency among medical students and residents while improving access to preventive and primary care services for refugees in the Western New York region
- completed pre- and post- test questionnaires on cultural competency. (Source: http://fammed.buffalo.edu/RefugeeHealth/)

Interprofessional Collaboration. The development of collaborative practices between dental health providers and other professionals benefits delivery of oral health education and services (Farokhi, Moshtagh, Junfin & Gureckis, 2014). Due to inadequate access to dental care caused by lack of dental providers willing to accept Medicaid, the medical field is attempting to educate underserved populations on topics related to oral health. The process of educating healthcare professionals on the importance of oral health is resulting in physicians taking on the role of oral health educators (Silk, 2010). New collaborative relationships are emerging between physicians and dental providers as patients are referred for care. A new interprofessional paradigm is inspiring the vision of collaborative healthcare models with a focus on increasing oral health literacy and access to services (Duley, Fitzpatrick, Zornosa, & Barnes 2012). Some medical and dental schools are incorporating interprofessional aspects of healthcare with the learning experiences of their students. For example, The University of Texas has successfully used interprofessional collaboration among several of its health profession programs to work with refugees as a part of a community service learning project which was aimed at offering free healthcare, dental care and dental education (Farokhi et al., 2014). Dental students work alongside medical students and nurses to provide free care to refugees visiting the San Antonio Refugee Health Clinic. This approach to treatment not only

empowers refugees to take charge of their oral health, but also provides culturally competent care for refugees from countries such as Nepal, Burma, Iraq, Iran, Congo, and Thailand.

Examples of successful collaborations include individuals and organizations that are not necessarily healthcare oriented. Valuable resources are organizations and individuals dedicated to assimilating refugees into our society. One of these organizations is the IISTL. In the 2004 article entitled *Health challenges for refugees and immigrants*, the director of client relations at the IISTL, Ariel Burgess, describes the health care challenges for refugees and immigrants currently residing in the United States. The report cites unique barriers to care, such as difficulties with cross-cultural and linguistic communication, lack of health literacy among immigrants and refugees, miscommunication between providers and patients, non-compliance, lack of cultural sensitivity of providers and lack of patient education. According to Burgess, the barriers often lead to misunderstandings between refugees and healthcare providers, which, in turn, lead to the underutilization and mistrust of the western healthcare system (Burgess, 2004). Due to these factors, one could assume oral health care and education may have a low priority among clients of the IISTL. However, during a community outreach effort conducted by this author in 2013 that included an oral health presentation for 120 refugees, the group demonstrated greater than expected interest in oral health education and services. The session included a 30-minute PowerPoint® presentation on dental and periodontal disease and its effect on systemic health. Participants were educated on proper oral hygiene and healthy nutrition. Volunteer dental hygiene students demonstrated proper brushing and flossing on educational dental models. Colgate®

provided toothbrushes and toothpaste for the event. The director of education of the IISTL, Anita Barker, summarized the success of the event in her letter from September 3rd, 2014 (see Appendix A).

Many may argue the problem with access to dental care can be attributed to inadequate Medicaid coverage of dental services, especially for refugee adults (rescue.org, 2016; MDSS, 2013). In Missouri, refugees are only eligible for emergency oral care services during the first 6 months of their residency in the United States. The 2013 benefit matrix from the Missouri Department of Social Services (MDSS) lists dental benefits for refugees under the refugee assistance program as "all adults over 21 receive dental care related to trauma to the mouth, jaw, teeth, or other contiguous sites as a result of injury or when the absence of treatment would adversely affect a pre-existing medical condition" (MDSS, 2013). Lack of Medicaid coverage and emergency services beyond the 6 months further limits access to dental services and oral health education. Although administrators who are entrusted with overseeing the integration of refugees into the healthcare system must recognize the barriers these groups face accessing healthcare in the United States, it is still possible for administrators to omit the oral health care issue for refugees altogether (Burgess, 2014). It is therefore important that administrators and oral healthcare providers work together in efforts to expand access to care for the refugee population.

Since the 2002 U. S. Surgeon General's report recognized the oral care disparity among the U.S. population and called for action on addressing issues such as oral health literacy, progress has been made (IOM, 2011). While the disparities in access to dental care continue, especially among ethnically diverse populations, there is evidence that oral

health professionals and professional organizations are answering the call to action. In 2006, the American Dental Association (ADA) adopted six oral health literacy related resolutions including the following (ADA, 2015b):

- Res. 14H-2006: The ADA recognizes that limited oral health literacy is a potential barrier to effective prevention, diagnosis and treatment of oral disease
- Res. 16H-2006: ADA agencies were directed to develop and implement a strategy to increase the number of school districts requiring oral health education for K-12 students
- Res. 17H-2006: Authorized the ADA president to appoint a three year National Oral Health Literacy Advisory Committee (NOHLAC)
- Res.18H-2006: Directed the Council on Access, Prevention and Interprofessional Relations (CAPIR) to design and execute oral health awareness and education strategy for the dental team
- Res. 19H-2006: Encouraged development of undergraduate, graduate and continuing education programs to train dental professionals on how to communicate effectively with ESL patients
- Res. 23H-2006: Requested that ADA agencies develop guidelines for creation of educational products to meet the needs of patients with limited literacy.

Cultural competency of oral health providers became one of the components of competencies for dental hygiene education, as drafted by ADHA (ADHA, 2012). Assessing strategies for effective communication between the dental hygienist (DH) and the client is also included in the research agenda (ADHA, 2007).

In 2008, the ADA updated the status of the resolutions and published several recommendations of the NOHLAC. The report highlighted the need for formal policy, acknowledging the importance of communication skills of dental personnel and development of a 3-5 year communication plan. It was recommended that CODA standards include health literacy and communication skills as standards for pre-doctoral and allied dental education programs. In addition, HL skills were considered as part of admissions criteria, health literacy was added to the ADA research agenda and research funding was expanded through the NIH multi-institute HL program announcement (ADA, 2015b).

Research shows that interprofessional and inter-organizational collaborations may be the key to reaching certain underserved communities. The importance of collaborative efforts among community agencies and dental professionals is also highlighted in literature (Sullivan, 2009). A critical role of DH in the future of oral health care will be found in collaborations with other professions and community organizations. The *Environmental Scan Report* predicted future demands for DH with the abilities to practice collaborative leadership within underserved communities (ADHA, 2011).

Geltman et al. (2013) recognized the importance of a community network in setting a model of priorities for refugees. Thus, it is reasonable to investigate whether the same networks may have the ability to increase the oral health literacy of refugee groups and, therefore, increase their access to dental care. The 2003 National Call to Action report highlights the importance of engaging populations and community groups in the development of HL and health promotion programs (NHH, National Call to Action, 2003). Oral health professionals should consider taking advantage of valuable resources

in the community when developing programs for diverse populations. Delivering oral health education through these networks should be considered as one of the solutions to the problem of insufficient dental care access. Moreover, this model does not have to be limited to ethnically diverse groups. Gaines, Levy and Cogdill (2011) demonstrated that any organization could contribute to the success of such networks. For example, the SMILE project is a coalition of libraries that came together to make reliable oral health literature available to the dental and medical community (Gaines et al., 2011). This is just one example of a successful collaboration among dental and non-dental agencies. Efforts such as these could ultimately lead to improving our nation's oral health literacy and lead to greater access to care for all.

Summary

The 2010 HHS report, A National Action Plan to Improve Health Literacy, identified racial and ethnic groups, refugees and immigrant as the most likely groups to experience limited HL. Research shows that low OHL among refugees is one of the contributing factors to inadequate access to dental care. Additionally, the immigrant population presents with other barriers to care, such as lack of dental insurance, lack of trust, fear, and traditional beliefs and practices. A multifactorial approach to increasing OHL and access to dental care for refugees could consist of culturally sensitive oral health education programs as well as multidisciplinary interventions. Research suggests that successful collaborations between culturally competent oral care providers, other professionals, and community organizations will be critical for the future of oral health. Emphasis must also be placed on the cultural sensitivity of oral health education program designers. Oral health educators should display cultural competence and be sensitive to

cultural beliefs, language preferences, and traditional practices of the target refugee populations. Understanding unique characteristics of ethnically diverse communities will have a positive impact on the providers' ability to present oral health information in a culturally appropriate manner. This will most likely result in positive interpretation and acceptance of oral health information and improved OHL.

Methodology

Research Design

This research study was conducted among the refugees affiliated with the IISTL. The IISTL serves more than 7,500 immigrants and refugees from 75 countries per year; immigrants and refugees comprise approximately 8% of the Saint Louis metropolitan foreign-born population (IISTL, 2015). The IISTL's Department of Education, through the ESL program, granted the Principal Investigator (PI) access to the participants. In consultation with the IISTL Director of Education, it was determined that refugees with an intermediate to advanced mastery of the English language would be the most suitable subjects for the study. The ESL classes meet once per week for 60 to 90 minutes. The PI met with the participants during class times on three different occasions. Due to the possibility of a language barrier and for accuracy of assessment, the study instruments were designed to display text in both English and in the native languages of the participants.

The study was a non-experimental quantitative survey research design (Borg, Gall & Gall, 2007). The study assessed the effect of an oral health education program on the OHL of refugees, the views held by the refugees on the importance of oral health, and the likelihood of future use by the refugees of dental care. A one-group pretest/posttest research design determined a) the impact of an oral health education program designed by the PI to increase OHL of refugees, b) the effect of the program on the perception of oral health as a contributing factor to systemic health c) the change in value that an

individual places on oral health, and d) whether the program results in a better understanding of dental disease and the importance of preventive and therapeutic interventions.

The study utilized two instruments. The Estimate of Oral Health Literacy – Bilingual 40 [EOHL-BL40] (see Appendix B) measured current oral health literacy of refugees in English and in the native language. The Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire (see Appendix C), investigated the participant's perceptions of oral health and use of dental care. The implementation of oral health education program (see Appendix D) followed and was concluded with the first posttest administration of the EOHL-BL40. Finally, the second posttest surveys, Estimate of Oral Health Literacy - Bilingual 40 [EOHL-BL40] and Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire, were administered two weeks later to measure retention of OHL and changes in the perceptions and planned use of dental care.

Research Questions:

1. Will the OHL of the refugee population in an ESL class taught at the International Institute of St. Louis increase with delivery of an oral health education program?
2. Will the refugee population demonstrate long-term retention of information learned in the oral health education class?
3. Will the refugee population place greater value on dental care, disease prevention, the oral-systemic link and oral health education?

   Each research question has an implied research hypothesis (alternative hypothesis).

Procedures

Human Subjects Protection/Informed Consent: Following an Institutional Review Board (IRB) approval from Eastern Washington University, the PI obtained permission from the IISTL Director of Education to conduct the research study (see Appendix E). Prior to the study, the PI met with the IISLT Director of Education to obtain a list of eligible ESL students. To maintain anonymity, each participant was assigned a code that was used on the surveys as an identifier. During the first meeting with the participants, the PI described the purpose and design of the research. The PI explained that participation in the study was voluntary and there was no penalty for non-participation. A consent letter was distributed to the participants (see Appendix F). A translation of the forms was provided by bilingual volunteers or by interpreters from the IISTL for a fee. Interpreters were available during all three phases of the study, but were not utilized. Each participant was assigned a coded number on the questionnaire for anonymity. A list of all names with corresponding coded numbers and language preferences as well as the data were kept under lock and key at the PI's private residence. All data on the PI's computer was password protected. Strict confidentiality was maintained for the study data and only the PI can decode the identity of the study participants.

Sample Source, Plan, Sample Size, and Description of Setting: A convenience sampling method was used for this study, consisting entirely of refugees from the IISTL. Due to the likelihood of language barriers, the selection of participants was critical to the successful implementation of the research. Four groups were selected to participate based on inclusion criteria. The study participant had to be a client of the IISTL and enrolled in

an ESL course offered by the IISTL. The client also had to have at least a conversational (intermediate) knowledge of the English language as determined by their enrollment in an intermediate level class. Per the IISTL Director of Education, Anita Barker, (personal communication, March 16, 2016), the ESL students are placed into various classes using Student Performance Levels (SPL), set by the Department of Elementary and Secondary Education and by scores on the Comprehensive Adult Student Assessment System (casas.org, 2016).

The refugees, who completed several English courses at the IISTL, were the most ideal candidates for the study. The IISTL Director of Education identified four groups of students enrolled in an intermediate level class or higher, which resulted in a pool of 98 (*N*=98) participants. The enrollment of participants in ESL intermediate level class was one of the inclusion criteria. In addition, the study participants had to (a) hold a refugee status and reside in the United States (b) have the ability to read and understand English at an intermediate level or higher (conversational English); and (c) be able to attend all three study sessions. The IISTL participates in a refugee resettlement program; therefore, its client population frequently changes and the ESL classes are ethnically diverse. Due to inconsistencies in attendance, the final size of the study group was 52 *(N*=52). Individuals from 17 different countries were represented among the research participants including Bhutanese, Burundi, Congolese, Colombians, Eritreans, Ethiopians, Hondurans, Iranians, Iraqis, Kenyans, Laotians, Mexicans, Myanmar, Pakistanis, Somalis, Sudanese and Vietnamese. The study was be implemented at IISTL campus in three sessions and was conducted during regularly scheduled ESL class times from 10 to 12 pm on Mondays.

The ESL instructors, volunteers and other employees of IISTL were present during the study to assist with administration of surveys and any communication needs.

Variables: The independent variable used in the study was an oral health education module of instruction (see Appendix D), designed by the PI specifically for this group of refugees. Socio-demographics collected during the first session with the participants were considered before the administration of the oral health education program. For example, age, nationality and dental history required additional revisions to the program to include information on cultural and generational differences in oral hygiene practices. The lecture consisted of a PowerPoint® presentation along with a visual demonstration and hands-on activities designed to educate participants on correct brushing and flossing techniques. The dependent variables were the participants' perceptions of oral health and oral health literacy from the Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire (see Appendix C) and OHL assessment from the Estimate of Oral Health Literacy - Bilingual 40 [EOHL-BL40] instrument (see Appendix B).

Instruments. Two surveys were used to gather data. The first was a Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire, which investigated the participants' personal information, such as age, gender and nationality. This survey also included dental history, oral hygiene practices and perceptions of oral health. The participants completed the questionnaire during the first phase of the study, before the day of oral health education presentation. The Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire was also administered during the third phase of the study, two weeks after administration of the oral health education module.

The participants were required to complete only the "oral health practices and perceptions" section of the questionnaire. The responses from the second administration of the Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire were compared to responses of the first phase of the study (initial meeting) to determine whether the oral health education program positively affected their perception of oral health and preventive services.

Reliability and Validity of the Socio-demographic and Oral Health Perceptions of Refugees Survey Questionnaire. The Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire (see Appendix C) is an original instrument created by the PI. The questionnaire was administered both in English and in the native languages of participants to ease understanding. The languages were dependent on the demographics of the participants at the time of the study.

The reliability and validity of the instrument were tested to address whether the survey questionnaire measured what it intended to measure and whether the demographic survey instrument consistently measured oral health perceptions of the refugee population (Norland, 1990; Radhakrishna et al., 2003). Developing a valid and reliable questionnaire is mandatory to reduce measurement error (Radhakrishna et al., 2003), which is defined as "discrepancy between respondents' attributes and their survey responses" (Groves, 1987, p.162).

The PI selected a pilot sample of 42 participants (N=42), from the refugee population but independent of the study group by purposive sampling. Using personal and professional sources, the PI recruited individuals from the St. Louis foreign-born community who agreed to serve as a sample group for the validation process. Additional

foreign-born individuals, each at different level of LEP, were referred from that group. The pilot sample was then used to test and establish the reliability and validity of the Likert scale (Likert, 1932) Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire (see Appendix C).

The reliability of the questionnaire was established by computing the Cronbach's Alpha from the pilot data using SPSS 21.0 (IBM, 2012). The overall Cronbach's Alpha for the 25 close-ended questions of the Likert Scale socio-demographic survey questionnaire was computed using SPSS 21.0 (IBM, 2012) to establish the internal consistency or reliability among the 25 questions of the questionnaire instrument (Griffin, 2005, Nunnally, 1978). Cronbach's Alpha coefficients were computed for the three levels or factors of the socio-demographic survey questionnaire and for the overall questionnaire (Griffin, 2005, Nunnally, 1978). The three levels or factors of the socio-demographic survey questionnaire in Appendix C are “Personal Information” with five (5) close-ended Likert-scale questions that generated ordinal-level responses; “Dental History” contained eleven (11) questions, and “Oral Health Practices and Perceptions” contained nine (9) questions. The individual Cronbach's Alpha coefficients for the three levels of the questionnaire and for the overall instrument were used to determine the strength of internal consistency or reliability among the questions that constitute each of the three levels or factors of the socio-demographics survey questionnaire instrument (Table 1.1).

Table 1.1

Cronbach's Alpha Coefficients for Establishing the Internal Consistency (Reliability) of the Socio-demographic Survey and Oral Health Perceptions of Refugees Instrument and its Three Levels (Pilot Sample, N=42).

Factors (Levels) of the Questionnaire	No. of Items	Cronbach's Alpha (α)
Personal Information	5	0.90
Dental History	11	0.87
Oral Health Practices and Perceptions	9	0.97
The Overall Survey Instrument	25	0.91

The Corrected Item-Total Correlation Coefficients and Cronbach's Alpha *"if each question of the demographic survey questionnaire is deleted"* was computed to determine the contribution of each of the twenty-five (25) close-ended ordinal-level response questions to the overall Cronbach's Alpha and to determine which questions to retain or drop. This further confirmed the strength of the internal consistency of the 25 questions that constitute the demographics survey questionnaire instrument.

The same pilot sample of 42 participants (N=42) for the reliability test was applied to validate the Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire (see Appendix C). The SPSS 21.0 (IBM, 2012) was used to compute the Pearson Product Moment Correlation matrix to validate the instrument (Table 1.2). The Pearson Product Moment Correlation matrix was generated at two levels: 1) the 25 individual questions of the demographics survey questionnaire correlated

with the total scores for each of the three levels (factors) of the instrument, and 2) the individual questions of the instrument correlated with the total scores for the 25 items of the instrument (Shuttleworth, 2009).

Table 1.2.

Pearson Correlation Coefficients between the 25 Individual Questions of the Socio-demographic and Oral Health Perceptions of Refugees Survey Questionnaire and the Total Scores for each of the Three Levels of the Instrument (Pilot Sample, N=42).

Factors (Levels) of the Questionnaire	No.	Correlation Coefficient	No.	Correlation Coefficient	No.	Correlation Coefficient
	1	0.8151**	11	0.8344**	21	0.8495**
	2	0.7678**	12	0.7915**	22	0.7515**
	3	0.9132**	13	0.8762**	23	0.7450**
	4	0.8803**	14	0.8073**	24	0.8371**
	5	0.7621**	15	0.8649**	25	0.7687**
	6	0.8437**	16	0.7985**		
	7	0.7765**	17	0.8734**		
	8	0.7460**	18	0.8157**		
	9	0.8929**	19	0.7628**		
	10	0.7855**	20	0.8354**		

** Correlation is significant at the 0.01 level ($p<0.01$)

Estimate of Oral Health Literacy Test - Bilingual 40. The second instrument of this research study was the 40-word Estimate of Oral Health Literacy (EOHL-BL40) (see Appendix B), which is a modified version of the REALD-30 (Lee, Rozier, Lee, Bender & Ruiz, 2007). The REALD-30 was chosen for the ease of administration, and for its good internal reliability and validity in English and in translated versions (Lee et al., 2011; Parker et al., 2012; Tadakamadla et al., 2014). Permission to use the REALD -30 instrument as a template for the modified word assessment test in this study was obtained from the authors of the original test (see Appendix F). English and translated versions of the EOHL-BL40 were used to assess the OHL of participants. Due to the size of the study group *(N*=52), time constraints and the number of languages spoken, comprehension component replaced word recognition. Participants were asked to circle only the words which they recognized and understood. The total number of words circled was divided by the total number of words on the list, and a score was awarded in percent.

The oral health literacy assessment tool utilized in this study expands the number of terms from 30 to 40 and presents the information in a bilingual format. The 40-word Estimate of Oral Health Literacy (EOHL-BL40) was translated into several languages (see Appendix B), either by bilingual volunteers or by interpreters from the IISTL for a fee. By using this new assessment tool in a bilingual format, the PI focused not only on word comprehension of English dental terms, but also on the participants' familiarity of the terms in their native languages. The OHL assessment was conducted during all three phases of the study. The initial assessment (pretest) was administered during the first meeting, second assessment (posttest one) immediately followed the oral health presentation and the third assessment (posttest two) was conducted two weeks after. The

goal of the last assessment was to demonstrate the effects of oral health presentation on the participants' oral health literacy and the retention of information over time. Data obtained from the second and third OHL assessment was compared to assess the retention of information learned in the oral health education session.

Equipment: The equipment required for the study included a large room able to seat 98 individuals, equipped with an overhead screen, a laptop computer, and a projector. The school cafeteria was reserved and served well for the purpose of the study. Additional tools included a white board and dry/erase markers. Colgate® donated over 100 toothbrushes, toothpaste and floss for all the study participants. Four hygiene demonstration models were on loan from A.T. Still University's Missouri School of Dentistry and Oral Health located in St. Louis, Missouri. These models were used to aid visual representation and hands on demonstration during the oral health education segment as well as during the last session of the study.

Implementation: Several meetings were held with the IISTL Director of Education prior to the study, to outline the protocol for methods of study, selection of participants, and data collection. During the last two meetings, the sample size and selection was finalized; all three visits to the facility were planned; the demographics of the sample group were discussed; and the language preferences of the study participants were determined and listed.

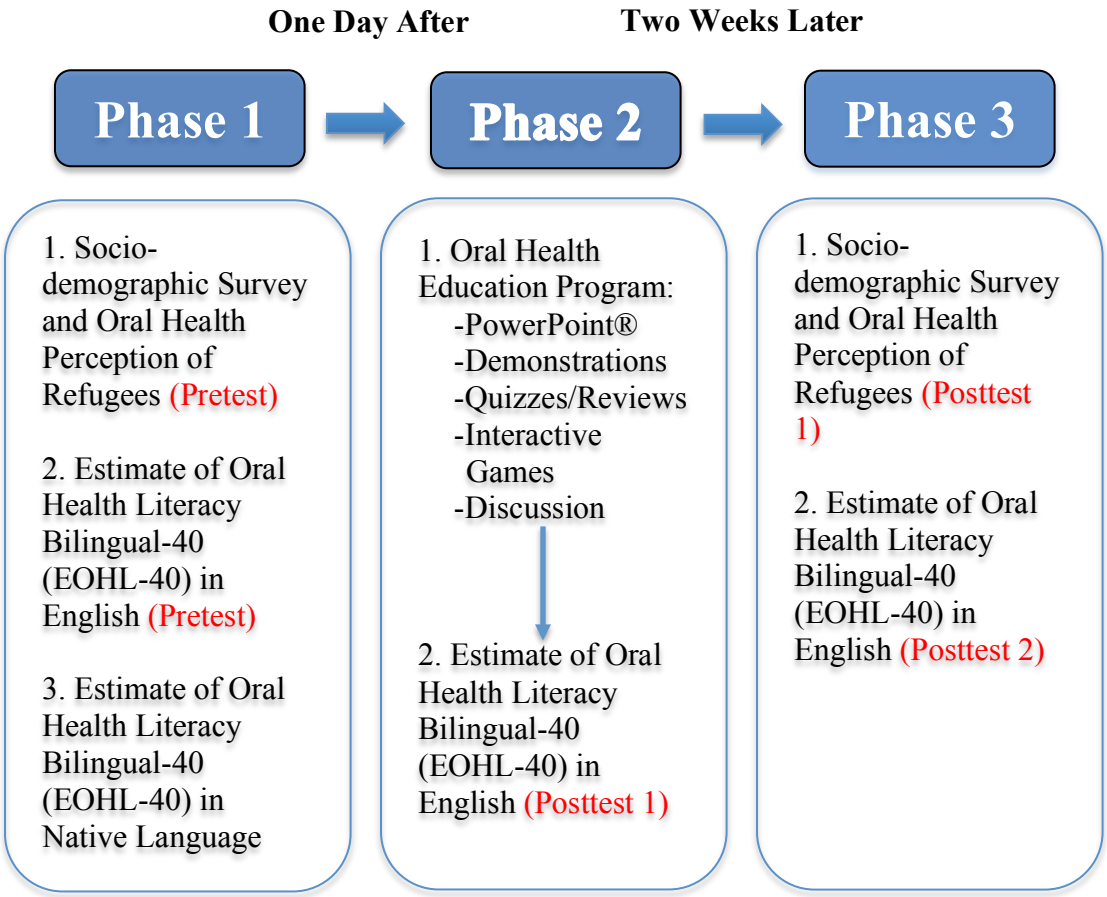
The PI met with the ESL instructors before conducting the study and several times thereafter to outline all three sessions and to coordinate distribution of surveys and collection of data. The ESL instructors were present for help with communication and/or

interpretation during the administration of the study. The equipment and presentation aids were secured before the first, second and third phase.

In the first phase, the PI arranged for and visited the IISTL campus. The PI informed participants about the study, gained a consent letter, and had participants complete the initial Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire along with the Estimate of Oral Health Literacy Test - Bilingual40 (EOHL-BL40) assessment test.

Figure 1.

Schematic of Three-Phase Research Study



The second phase was conducted two weeks after the first phase at the same time and location. During the second phase, the PI presented the Oral Health Education program. The implementation consisted of a 50-minute PowerPoint® presentation, along with a visual demonstration and hands-on activities designed to educate participants on correct tooth brushing and flossing techniques. Following the presentation, the participants were evaluated on their tooth brushing and flossing skills during the hands-on phase using the teach-back method. The OHL assessment post-test was also given.

Two weeks after the second phase of the study, the third and final phase of the study was conducted. The participants were asked to complete a final post-test of the Estimate of Oral Health Literacy Test - Bilingual40 (EOHL-BL40), to determine the degree of retention of material learned during the oral health presentation. At the same time, the demographics survey questionnaire was administered again, with the participants completing only the oral hygiene section of the questionnaire.

The first, second and third OHL test results were compared to determine the effect of the Oral Health Education program on the improvement of OHL. The participants' responses were compared to the phase one data to determine whether the oral health education program affected the perception of oral health and values placed on disease prevention. The responses to the questions from the oral hygiene section of the demographics survey questionnaire was used to address research question three (3) and measured the effect of oral health presentation on the participants' perceptions of oral health, beliefs in preventive care, and the impact of oral health on general well-being.

Summary

To examine the influence of oral health education program on OHL and access to dental care in the refugee population. The three-phase non-experimental quantitative research was conducted at IISTL (St. Louis. MO). It included a group of 52 refugees, implementation of an oral health education program and a pretest/posttest analysis of two surveys, a Socio-demographic Survey and Oral Health Perceptions of Refugees and an Estimate of Oral Health Literacy – Bilingual 40 (EOHL-BL40). Statistical analyses were performed using SPSS 21.0 software.

Results

Description of Sample

This quantitative descriptive study design utilized a convenience sample consisting of 52 *(N*=52) refugee clients of the IISTL. The data analysis for the Socio-demographic Survey and Oral Health Perceptions of Refugees and the EOHL-BL40 word assessment were analyzed using SPSS 21.0 (IBM, 2012). The study included 52 participants representing 17 countries speaking 17 different languages.

As shown in Table 2.1, the study group comprised of 42.3% (*n*=22) of men and 57.7% (*n*=30) of women. The largest age group, 40.3 % (*n*=21) were individuals between 31 and 50 years of age, followed by the 51 to 76 year old at 38.5% (*n*=20) and finally the 19 to 30 year olds at 21.2% (*n*=11). The average age was 45.5 years (SD = 15.5 years).

Table 2.1

Descriptive Statistics of Socio-demographic Survey and Oral Health Perceptions of Refugees (Age and Gender)

Characteristics	Number of participants (*n*)	% of N (*N*=52)
Age		
19-30	11	21.2
31-50	21	40.3
51-76	20	38.5
Gender		
Male	22	42.3
Female	30	57.7

Table 2.2 lists the participants' native countries and years in the USA. The refugees have been residing in the US from 2 months to 23 years, 4.7 years on average. The largest group was from Bhutan (Asia) at 32.69% (*n*=17) and the least represented countries were Kenya, Lao, Mexico, Myanmar, Pakistan and Columbia, respectively at 1.9%, (*n*=1).

Table 2.2

Descriptive Statistics of Socio-demographic Survey and Oral Health Perceptions of Refugees (Ethnicity)

Characteristics	Number of participants (*n*)	% of N (*N*=52)
Ethnicity		
Bhutan	17	32.69
Burundi	2	3.85
Colombia	1	1.92
Congo (DR)	2	3.85
Ethiopia	4	7.69
Eritrea	2	3.85
Honduras	2	3.85
Iran	2	3.85
Iraq	8	15.38
Kenya	1	1.92
Lao (PDR)	1	1.92
Mexico	1	1.92
Myanmar	1	1.92
Pakistan	1	1.92

Table 2.2 (*continued)*

Descriptive Statistics of Socio-demographic Survey and Oral Health Perceptions of Refugees (Ethnicity)

Characteristics	Number of participants (*n*)	% of N (*N*=52)
Somalia	3	5.77
Sudan	2	3.85
Vietnam	2	3.85
Years in USA		
0-7	42	80.8
9-15	4	7.7
16-23	6	11.5

The data in Table 2.3 represents the level of education of refugees, their self-reported knowledge of the English language and placement into ESL courses at IISTL. The number of years spent in school ranged from 0 to 16 years. The results showed that the level of education was almost evenly split among three groups; 0 to 5 years 34.6% (*n*=18), 6-10 years 34.6% (*n*=18) and 11-16 years 30.8% (*n*=16). The self-reported knowledge of English ranged from poor 63.5% (*n*=33) to fair 28.8% (n=15) to good 7.7% (*n*=4). The study group encompassed 4 levels of intermediate level classes offered at the IISTL. As Table 2.3 shows, the Low-Intermediate level class was represented by 23.1 % (*n* =12) of participants, Mid-Intermediate level at 34.6% (*n* =18), and High-Intermediate level at 32.7% (*n* =17) and Advanced level at 9.6%. (*n* =5).

Table 2.3

Descriptive Statistics of Socio-demographic Survey and Oral Health Perceptions of Refugees (Education)

Characteristics	Number of participants (*n*)	% of N (*N*=52)
Years of School Completed in Native Country		
0-5	18	34.6
6-10	18	34.6
11-16	16	30.8
Knowledge of English		
Poor	33	63.5
Fair	15	28.8
Good	4	7.7
ESL Course Placement per International Institute of St. Louis		
125 - Low Intermediate	12	23.1
150 - Mid-Intermediate	18	34.6
200 - High Intermediate	17	32.7
250 - Advanced	5	9.6

Statistical Analysis

After collection of the completed surveys, data were organized into spreadsheets using the Microsoft Excel® program. Statistical analyses were performed using SPSS 21.0 software.

To answer research question one, the Estimate of Oral Health Literacy Test - Bilingual40 (EOHL-BL40) was used before and after the oral health education program (Pretest and Postest1, respectively). To address its implied research hypothesis, the OHL assessment data for the second and third phases of the study after the delivery of the health education program, was paired and compared using the SPSS 21.0 Paired t-Test Procedure (IBM, 2012). The outcome of the statistical analysis for research question 1 and its implied hypothesis was interpreted to determine whether oral health literacy of the refugee population improved after the delivery of the oral health education program module (Table 3-7).

To answer research question two, Estimate of Oral Health Literacy Test - Bilingual40 (EOHL-BL40) was used before, immediately after, and two weeks after the oral health education program (Pretest, Posttest 1 and Posttest 2, respectively). To address its implied research hypothesis, the OHL assessment data for the first and third phases of the study after the delivery of the oral health education program, was paired and compared using the SPSS 21.0 Paired t-Test Procedure (IBM, 2012). The outcome of the statistical analysis for research question 2 and its implied hypothesis was interpreted to find out if the refugee population showed long-term retention of information learned in the oral health education program (Table 3-5).

Below are Tables 3 to 7 with results from statistical analyses related to the EOHL-BL40 word comprehension in English (Pretest, Posttest 1 and Posttest 2) and in Native language. Results of analysis in Tables 3, 4 and 5 were interpreted to answer research questions one and two. Tables

6 and 7 compare the number of known words in English versus the number of words understood in the native language of participants.

Table 3 describes Analysis of Variance indicating significant difference between the number of words the refugees understood in English before (Pretest) the oral health education program, immediately after the presentation (Posttest 1), and two weeks after the presentation (Posttest 2) ($p<0.05$).

Table 3

One-Way Analysis of Variance to Compare the Words Understood by Refugees in English Before Oral Health Education Program, Immediately After the Presentation, and Two Weeks After the Delivery of the Education Program, for the EOHL BL-40 Survey (N=52)

Group Variation	Mean Squares	DF	F-value	Significance
Between Groups	35112	2	184.09	0.00*
Within Groups	190.7	153		

Note. * = Significant at $p<0.05$; DF = Degree of Freedom

Table 4 shows multiple comparisons of words understood in English during Pretest, Posttest 1 and Posttest 2 for the EOHL-BL40 survey. Each comparison shows significant difference ($p<0.05$).

Table 4

Multiple Comparisons of the Words Understood in English Before Presentation (Pretest), Immediately After Presentation (Posttest1), and Two Weeks After Presentation (Posttest 2) for the EOHL BL-40 Survey (N=156)

Group	Significance
Pretest versus Posttest 1	0.00*
Posttest 1 versus Posttest 2	0.00*
Pretest versus Posttest 2	0.00*

Note. *Significant as $p<0.05$ (2-tailed)

Table 5 indicates the number of words understood in English in EOHL-BL40 pretest, posttest 1 and posttest 2. Difference between all three was statistically significant ($p<0.05$).

Table 5

Pretest – Posttest Results of EOHL BL-40 in English

	Pretest (%)		Posttest 1 (%)		Posttest 2 (%)	
	Mean	SE	Mean	SE	Mean	SE
EOHL-BL40 in English	15.29	1.24	28.61*	2.41	25.48*	2.37

Note. * Significant at $p<0.05$

In Table 6, the outcome of the Independent T-test analysis indicates that there was a significant difference between the number of words understood by the refugees when they read in English and their native languages at the 95% probability certainty ($p<0.05$). The data implies that the refugees understood more words on the EOHL-BL40 (pretest) survey in their native languages than in English.

Table 6

Independent T-test for Equality of Means for Number of Words Understood in English Compared to the Number of Words Understood in Native Languages in the EOHL-BL40 Questionnaire before the Oral Health Education Presentation (N =104)

Number of Words Understood	T-value	DF	Significance (2-tailed)
Number of Words Understood in English Versus The Native Languages of the Refugees	8.21	102	0.00*

Note. * Significant at p<0.05; DF = Degree of Freedom

The data in Table 7 shows that, on average, the refugees understood 15% of words in English (pretest), compared to 47% of words presented in native language.

Table 7

Number and Percent of Words Understood in English Compared to Words Understood in Native Language

	Mean			
	Number	SE	%	SE
EOHL BL-40 in English (pretest)	6.12	0.50	15.29	1.24
EOHL BL-40 in Native Language	18.92*	1.48	47.31*	3.70

Note. * Significant at p<0.05, SE = Standard Error of the Mean

Table 8 shows the current health and dental insurance status of the refugees. As indicated, only 36.5% of participants carry private health insurance and 5.8% dental insurance. In addition, 53.8% are covered under Medicaid and 19.2% have Medicare.

Table 8

Descriptive Statistics of Socio-demographic Survey and Oral Health Perceptions of Refugees (Insurance Status).

Characteristics	Number of participants *(n)*	% of N (N=52)
Health Insurance		
Yes	19	36.5
No	34	63.5
Dental Insurance		
Yes	3	5.8
No	49	94.2
Medicaid		
Yes	28	53.8
No	24	46.2
Medicare		
Yes	10	19.2
No	42	80.8

To answer research question three and address its implied research hypothesis, the data for the oral hygiene (oral hygiene practices and perceptions) section of the Socio-demographics Survey and Oral Health Perceptions of Refugees questionnaire for the pre- and post-delivery (Pretest and Posttest 1) of the oral health education program were paired and compared using the SPSS 21.0 Paired t-Test Procedure (IBM, 2012). The interpretation of the statistical outcome was used to determine whether the refugee population value dental care, disease prevention, the oral-systemic link and oral health education more after the delivery of the oral health education program than before (Table 9 -11).

Below are Tables 9 and 10 that list the Pretest and Posttest responses to

questions related to oral health perceptions and practices from the Socio-demographic Survey and Oral Health Perceptions of Refugees. Table 9.1 shows that out of the group (*N*=52), 13.5% (*n*=7) have regular yearly dental checkups. There are reasons listed for not seeking out preventive care, including lack of finances 55.6% (*n*=25), lack of dental insurance 37.8% (*n*=17) and inadequate access to dental services 6.7% (*n*=3).

Table 9.1

Dental History of Refugees (Frequency of Dental Visits)

Variable	Number of participants (*n*)	% of N (*N*=52)
Last Dental Visit		
In 2015	14	26.9
2-3 years ago	5	9.6
4-6 years ago	6	11.5
6-10 years ago	1	1.9
10 years or more	1	1.9
Never	25	48.1
Yearly Dental Checkups		
Yes	7	13.5
No	45	86.5
Reason for No Dental Checkups*		
Too Expensive	25	55.6
No Insurance	17	37.8
No Access	3	6.7

Note. * Seven study participants responded "yes" to question # 2 (Yearly Dental Checkup), and were, therefore, were excluded from analysis of question #3.

Table 9.2 describes dentally related concerns of refugees. It indicates that 42.7%

(*n*=22) of participants were experiencing tooth pain at the time of the study. In addition, participants reported the following: bleeding gums when brushing or flossing 42.3% (*n*=22), broken teeth 32.7% (*n*=17), missing teeth 48.1% (*n*=25), sensitive teeth 46.2 % (*n*=24) and loose teeth 25% (*n*=13). Xerostomia was reported by 26.9% (*n*=14) of participants and 28.8% (*n*=15) of participants suffered from halitosis.

Table 9.2

Dental History of Refugees (Dentally Related Concerns)

Variable	Number of participants (*n*)	% of N (*N*=52)
Missing teeth		
Yes	25	48.1
No	27	51.9
Mouth Odor (Halitosis)		
Yes	15	28.8
No	37	71.2
Bleeding Gums		
Yes	22	42.3
No	30	57.7
Broken Teeth		
Yes	17	32.7
No	35	67.3
Tooth Pain		
Yes	22	42.3
No	30	57.7

Table 9.2 (*continued*)

Dental History of Refugees (Dentally Related Concerns)

Variable	Number of participants (*n*)	% of N (*N*=52)
Sensitive Teeth		
Yes	24	46.2
No	28	53.8
Loose Teeth		
Yes	13	25
No	39	75
Dry Mouth (Xerostomia)		
Yes	14	26.9
No	38	73.1

Table 10 shows oral health perceptions and practices of refugees prior to the intervention of an oral health education program.

Table 10

Before Presentation (Pretest) Descriptive Statistics for the Oral Health Practices and Perceptions of the Socio-demographic Survey and Oral Health Perception of Refugees (N=52)

Oral Health Practices and Perceptions	Min	Max	Mean	SD
How many times do you brush your teeth a day?	1	3	2.48	0.03
How many times do you clean between your teeth?	0	3	1.79	0.02
Are you happy with your teeth?	0	1	0.54	0.05
Have you been educated about oral health?	0	3	0.81	0.03
Have you been treated by a dental hygienist?	0	3	0.65	0.04
Would you like to learn how to keep your mouth and teeth healthy?	0	3	2.40	0.01

Table 10 (*continued*)
Before Presentation (Pretest) Descriptive Statistics for the Oral Health Practices and Perceptions of the Socio-demographic Survey and Oral Health Perception of Refugees (N=52)

Oral Health Practices and Perceptions	Min	Max	Mean	SD
How important is oral health?	0	3	2.12	0.01
How important is oral health to your general health?	0	3	2.52	0.07
Are you planning to visit a dental clinic in the next six months?	0	3	2.10	0.09

Table 11 shows oral health perceptions and practices of refugees after the intervention of an oral health education program.

Table 11

Descriptive Statistics for the Oral Health Practices and Perceptions of the Refugees after the Oral Health Education Program

Oral Health Practices and Perceptions	Min	Max	Mean	SD
How many times do you brush your teeth a day?	0	3	2.79	0.01
How many times a day do you clean between your teeth?	1	3	2.77	0.04
Are you happy with your teeth?	0	1	0.67	0.03
Have you been educated about oral health?	0	3	2.44	0.01
Have you been treated by a dental hygienist?	0	2	0.69	0.02
Would you like to learn how to keep your mouth and teeth healthy?	0	3	2.85	0.05
How important is oral health?	2	3	2.90	0.03
How important is oral health to your general health?	2	3	2.79	0.04
Are you planning to visit a dental clinic within the next six months?	2	3	2.15	0.09

Discussion

Summary of Major Findings

The objective of this research was to assess the OHL of refugees in St. Louis, Missouri, and to evaluate the effect of an oral health education program on OHL and oral health perceptions. The results indicated that the oral health education program had a significant effect on the OHL of refugees, and on their perceptions and oral health practices. Participants scored higher on EOHL-BL40 word comprehension after the education program and also showed a good retention of information learned. Moreover, the results of the OHL assessment in the participants' native languages were significantly higher than OHL assessment in English, suggesting that while the refugees may not have understood the meaning of some of the dental terms, when presented in English, they comprehended many more terms when presented in their native languages.

It was also investigated whether the refugee population placed greater value on dental care, disease prevention, the oral-systemic link and oral health education after the completion of an oral health education program than before. The results indicate that after the oral health education program, refugees embraced the habit of brushing and flossing their teeth more frequently. More refugees acknowledged receiving oral health education and were interested in participating in other similar classes. Participants also acknowledged the importance of oral health and its influence on general health. In addition, more refugees considered a visit to a dental clinic after the PI presented the oral health education program. In conclusion, oral health education programs are effective at

improving OHL and oral health perceptions of refugees. Moreover, the bilingual word comprehension test is effective at assessing the OHL of refugees.

Discussion

This research utilized an innovative way of assessing the OHL of individuals. The study evaluated ethnically diverse group of refugees, incorporating bilingual surveys, a pretest and posttest research design, and an intervention of an oral health education program. The results of the research demonstrated the effectiveness of an oral health education program on the OHL of refugees using the EOHL-BL40 word assessment. This suggests that the program had a positive effect on the OHL of refugees. The participants retained most of the new information learned during the oral health education program two weeks prior. This indicates the need for ongoing oral health education programs for refugees to help retain and reinforce new knowledge of dental terms.

Research suggests negative effect of low OHL on oral health and access to care (Atchison et al., 2010; Horowitz, 2013; Geltman et al., 2013; IOM, 2011); therefore, it is possible that improved OHL of the participants of this study and their increased appreciation for preventive and restorative care, may have a positive affect on their oral health and may lead to greater utilization of dental services.

One of the major differences between the OHL assessments in this and other similar studies (Lee et al., 2007) was that this study evaluated word comprehension versus word recognition. Some researchers argue that word recognition may not reveal the person's true OHL level (Arora et al., 2012; Parker et al., 2012; Khan et al., 2014). The results of this study support that argument. By adding a comprehension component and a translation to the OHL assessment instrument, the PI obtained a more accurate

assessment of the participants' oral health literacy. The gap between the knowledge of dental terms in English and in the native language could be an important component of future design and administration of educational programs for refugees. It also signifies the importance of collaboration with interpreters and other stakeholders within ethnically diverse communities. The effect of oral health education programs on OHL has been studied in the past (Parker et al., 2012) and has shown results that are similar to the current study (Brown et al., 2005). Ongoing oral health education programs may help retain and increase the OHL literacy of this population.

The PI observed that as some of the participants completed the EOHL-BL survey, they were able to pronounce words on the form correctly as they read them out loud, but they did not circle them; this indicates that they did not understand the meaning. For a group of this size, a word comprehension test seemed a more appropriate form of OHL assessment than a word recognition test that requires a one-on-one interview for an assessment and is only based on word pronunciation (Lee et al., 2007). Moreover, the incorporation of a word comprehension test has shown high scores in OHL assessment in previous studies (Khan et al., 2014).

This research also incorporated word comprehension EOHL-BL40 in the native languages of participants to assess their OHL. The bilingual administration of the OHL assessment test (EOHL-BL40) resulted in significant differences between word comprehension when tested in English versus in the native language of participants, indicating that the OHL of refugees was much higher than one may have previously thought. This data is significant and would not have been identified if the PI had used OHL assessment in English only. The bilingual method of evaluation is not very common

in OHL research in the United States, with the exception of Spanish (Lee et al., 2012) but its consideration is imperative for future studies. In addition to the benefit of evaluating OHL in native languages, it also facilitates learning because participants see the English equivalent of the dental terms as they complete the EOHL-BL40 survey. It is the opinion of the PI that the result of OHL assessment in the participant's native language is an important component of overall OHL assessment of refugees and immigrants. Lack of this type of OHL assessment signifies a gap in an area of research that needs to be explored further due to the existing and growing diversity of the US population. Research shows that translated versions of similar tests have shown good internal reliability and validity (Tadakamadla et al., 2014; Junkes et al., 2015).

The results of the study indicate a successful delivery of oral health information to a large group of refugees. The combination of visual, audio and interactive delivery seemed to have reached a diverse group of learners. One of the most important aspects of this implementation was that the PI was present to clarify and reinforce the information in the presentation. In addition, any concerns or question that came up during the delivery of the oral health education program and subsequent posttests were addressed immediately.

Currently, there is a gap in research investigating the delivery of oral health education programs and their effects on the OHL of refugees in the U.S. Similar studies seem to be limited to Spanish speakers. Brown and colleagues (2005) investigated the effect of an oral health education program on Latino immigrant parents where a school nurse administered a pretest and a posttest utilizing questions about oral health with some success in improving oral health knowledge of participants. Existing literature shows other educational methods were utilized in prior OHL studies abroad, including the

delivery of pamphlets and audio recording to refugees and immigrants with some success (Kumar et al., 2011; Arora et al., 2012).

Numerous studies suggest barriers to dental care in various ethnic groups (HHS, *National Call to Action*, 2003). In this study, results indicate a lack of dental care within the refugee population with approximately half of the group never visiting a dentist. It was also concerning that nearly half of the participants reported having dental pain at time of the study. Most contributed the reason for not seeking dental care to the lack of dental insurance and personal finances. However, it was encouraging that, regardless of their barriers to dental care, most of the study participants expressed overwhelming interest in learning about oral health. The vast majority of the study group has expressed their positive opinion about the importance of oral health, even before the administration of the oral health education program. This interest has increased after the oral health education program, as has the intention of the group to seek dental care within the next 6 months, especially after receiving information on affordable dental clinics in the St. Louis area.

Current literature shows that interprofessional collaboration has a positive impact on improving dental care access for underserved communities (NHH, National Call to Action, 2003; Burgess, 2004; Quiriga & Berthold, 2004; ADHA, 2011; Duley et al., 2012; Farokhi et al., 2014). It is also a major focus of reports and initiatives calling for more collaboration between oral health professionals and community organizations as these have proven successful in previous studies (Ogungbenro, Mickenautch & Rudolph, 2000; NHH, National Call to Action, 2003; Sullivan, 2009; Manusco, 2011; Geltman et al., 2013). For example, Manusco (2011) described the development of a HL program for

Indonesian immigrants and highlighted the importance of collaboration between healthcare providers and cultural community leaders. The collaborative approach was utilized throughout the current project. This study was possible thanks to an effective cooperation between the PI, the IISTL, volunteers from various ethnic communities and other local organizations that support immigrant and refugee communities in the St. Louis region. All of them have contributed to the success of the research and their participation is a testimony to the impact of interprofessional collaboration on improving OHL and access to care for ethnically diverse populations. In addition, the experience generated additional interest in future collaborations. For example, members of numerous cultural and ethnically diverse communities and organizations, such as the Vietnamese community and Vintendo4Africa, expressed interest in similar programs to be administered to their communities and stated their willingness to assist with planning and administration of future educational programs.

The interprofessional collaboration between the PI and IISTL was an ongoing process. Over a period of two years, the PI met with the Director of Education of the IISTL to plan and finalize details of the study, as it had to be incorporated into the curriculum of the participating ESL classes. Another major component of the planning was an orientation meeting between the PI and the ESL instructors who assisted with the distribution and collection of surveys. Additionally, the ESL instructors were very helpful in informing the PI of any limitations which may have affected the study and aided with administration of the surveys to the participants

The PI was the first oral health professional who approached the IISTL since its inception in 1919. As suggested in literature, limited involvement of oral health

professionals in ethnically diverse communities may be attributed to lack of cultural competence and insufficient diversity among oral health providers (Garcia et al., 2008; HHS, Healthy People: Understanding and Improving Health 2010, 2000; ADHA, 2011). As studies suggest, additional efforts are needed to recruit ethnically diverse individuals into the dental field to better reflect the cultural and ethnical makeup of the diverse populations (CODA, 2010; rescue.org, 2016; Rowland et al, 2006). In addition, greater emphasis needs to be placed on increasing the cultural competence of students in dental and dental hygiene schools (HHS, 2000c; Rowland et al., 2006; CODA, 2013; Horowitz, 2013; ADHA, 2015). This may include increasing the ethnic diversity of students and faculty, adding cultural competence courses with service learning in refugee and immigrant communities, collaborating with international dental and dental hygiene schools on study abroad programs, including guest speakers from ethnically diverse communities, and partnering with client representatives from organizations such as the IISTL. A good example of a culturally competent dental program is the Refugee and Cultural Awareness Program at the University of Buffalo (University of Buffalo, 2016).

The results of the Socio-demographic Survey and Oral Health Perceptions of Refugees questionnaire showed that there is an increased awareness about oral health among the study participants. Following the study, some of the participants requested another presentation and more information on similar events. Several participants asked about pathways toward dentally related education programs and careers. This is extremely encouraging and indicates that oral health providers and educators should look for innovative ways to reach out to ethnically diverse communities and begin the conversation. For example, the IISTL would be an ideal setting for a dental assisting

program. There are a number of training programs offered by the IISTL including certified nurse training program (iistl.org, 2016). The addition of a dental assisting program could potentially increase the ethnic diversity of allied dental providers in the St. Louis region. As literature suggests, the inclusion of dental professionals from ethnically and culturally diverse communities in the dental field may increase dental care access for the foreign-born (Ogungbenro et al., 2000; rescue.org, 2016). The positive results of this study are a testament of that, as the PI is a former refugee and an immigrant.

Limitations

There were several limitations to the study, one of them being the convenience sampling method. This method was necessary, given the limitations of availability of refugees who met research criteria, but it limits the general application of this study.

Word comprehension of EOHL-BL40 words was limited by the self-reporting nature of the answers. Including a one-on-one interview would further validate the responses. However, this would require availability of funds to cover the cost of translators and interviewers.

Additional barriers presented before and during the course of the study were initial access to the refugee population. The IISTL has never facilitated a study of this type or collaborated with dental professionals; therefore, the level of interest in oral health education among its clients was unknown. To overcome this barrier, the PI obtained permission to present a brief PowerPoint® on oral health to a group of 120 refugees. The degree of interest was high and opened the door for a large-scale research study.

Between January 2014 and February 2016, numerous meetings were held at the IISTL between the primary investigator and the Director of Education during the planning stage of the research. Originally, the study was scheduled for December 2015. However, the study was delayed due to relocation of the facility and due to winter break. Unforeseen circumstances, such as these, should be factored into future studies.

There were also some difficulties with finalizing the list of study participants. The goal was to have a sample size of 98 participants. Despite excellent cooperation of the ESL instructors and extensive interprofessional collaboration between the Director of Education and the PI, it was difficult to secure the presence of all participants in all three phases of the study. Some of the refugees had prior engagements or were ill at the time of the study: therefore, they were not able to attend. In addition, historically, the ESL students move through the ESL classes quickly and are transferred from one class to another on weekly or biweekly bases; therefore, the list was not finalized until the two weeks prior to the study. Because of these factors, the sample size was reduced from 98 to 52 participants.

The lack of funding to cover the cost of the translation of the surveys presented an additional challenge. To limit the cost, the PI recruited volunteers from various ethnic groups and organizations who aided with translation of some of the forms. Despite the generosity of volunteers, the PI was faced with substantial costs for the translation at $70 per page. The cost of translation services needs to be considered in future research of this type.

Due to the size and character of the study group, the administration and distribution of the surveys could not have been as efficient without the help of ESL

instructors, as all forms were coded for the privacy of the participants. In addition, the in-class promotion of the study positively affected participant turnout.

Recommendations/Suggestions for Future Research

The results of this study indicate the effectiveness of an oral health education program on the OHL of refugees. In addition, the results show the importance of OHL assessment in English and in the native language of refugees and immigrants using the word comprehension method. These findings can be implemented chair side in dental offices, public dental clinics, and in dental and dental hygiene schools across the country. Findings can also be implemented by incorporating the use of technology to identify gaps in OHL and to customize the oral health education delivery for ethnically diverse patients.

The success of the study also suggests the effectiveness and the importance of collaboration among dental professionals and other stakeholders in the community. It is imperative that oral health professionals seek out opportunities to approach ethnically diverse populations through community leaders and organizations. Interprofessional collaboration among dental care providers and institutions, such as the IISTL, is essential to increasing OHL, oral health awareness and access to dental care for refugees and immigrants.

Increasing diversity in dental schools, dental hygiene schools and dental assisting schools could be one step towards improving oral health for diverse communities. School administrators could also consider the expansion of cultural competence courses in the curriculum to address unique needs of their community. An effective strategy may include innovative strategies for learning and cultural immersion, such as the utilization

of guest speakers from ethnically diverse groups and collaborations with community organizations on research and community outreach efforts.

The study could also have been enhanced by breaking the large group into smaller groups based on the level of English language proficiency, which would then allow inclusion of one-on-one interviews utilizing interpreters to verify comprehension of words. This would also allow for the delivery of customized oral health education to individual participants. In order to achieve these enhancements, funding for interpretation services would have to be available and more time for the study allocated.

More research should also be done on specific ethnic groups related to their level of OHL, specific communication needs, levels of English comprehension and dental needs. This would aid in the development of more effective programs for individual groups of refugees and immigrants.

Future access to dental care for this refugee population is uncertain. The issue is further complicated by the fact that Medicaid in the state of Missouri does not cover preventive and restorative dental services for most adults (macpac.gov, 2015). The refugees are aware of that, which may explain their reluctance to seek out dental services, even after participating in this study. The PI informed the group that some services may become available with the proposed expansion of Missouri's Medicaid program in 2016 (Harbitson, 2016). In the meantime, the primary investigator provided information about student dental hygiene clinics in St. Louis offering free or deeply discounted services such as radiographs, dental exam and cleanings. Preliminary feedback of the refugees suggests that in light of the new information, more may be planning a visit to one of the student dental hygiene clinics

Conclusions

Low OHL has been recognized as one of the major barriers to dental care. The body of OHL research is growing and the topic is on the agenda of leading organizations in healthcare and dentistry. Dental professionals have been called to act and lead the way in improving access to care through community programs facilitated by interprofessional collaborations (NHH, National Call to Action, 2003; Burgess, 2004; Quiriga & Berthold, 2004; ADHA, 2011; Duley et al., 2012; Farokhi et al., 2014). The involvement of dental professionals in OHL research, assessment and development of interventional programs is critical to the improvement of OHL in the US population. It is especially important to provide care to the most vulnerable segments of the US populations, such as the foreign-born (NHH, National Call to Action, 2003; Burgess, 2004; ADHA, 2011). This cannot be accomplished without addressing the lack of diversity and cultural competence among providers (Ogungbenro et al., 2000; Rowland et al, 2006; CODA, 2010; rescue.org, 2016). This research is an example of how a culturally appropriate oral health education program can make a difference in an ethnically diverse community. By utilizing a modified method of OHL assessment and educational program delivery, this study was able to remove barriers and improve OHL of a refugee population. The focus on word comprehension and inclusion of translated version of EOHL-BL40 into multiple languages allowed for additional level of word comprehension assessment that indicated a gap in OHL assessment of refugees when limited to English versus expansion of assessment to include the native language of participants. More research needs to be done

to identify OHL deficiencies in various ethnic communities and to model oral health education programs to the specific needs of refugees and immigrants. This will require an ongoing commitment from oral health professionals and their willingness to engage in cross-cultural outreach with the engagement of community leaders and organizations.

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Appendix A

INTERNATIONAL INSTITUTE
SAINT LOUIS

September 3, 2014

Re: Ms Romana Muller

To Whom It May Concern:

I write this letter to commend and thank Romana Muller for the impact she has had on the refugee and immigrant students that attend classes at the International Institute of St. Louis. Thanks to Ms Muller's initiative and outreach efforts beginning in February 2014, our students have increased their understanding of the importance of dental health and how they can access affordable dental health care.

My first experience with Ms Muller was when she contacted the Institute to ask about allowing her to do a Dental Health informational session here at the Institute. As an immigrant herself, Ms Muller was personally aware of the dental health needs of the foreign-born including culturally different perceptions of dental health, lack of information on dental care options and community resources in St. Louis, and problems from years of lapsed dental care, especially in the case of refugees for whom dental care was a low priority and/or unavailable for extended periods during camp survival before coming to the US.

The result of her contact was a Dental Health Informational session Ms Muller provided at the Institute on February 19, 2014. In that session, Ms Muller (assisted by her dental hygiene students who distributed information and samples), was able to provide clear, comprehensible information to 95 attendees, all of whom have limited English proficiency. Despite not having native language interpreters to support her presentation, Ms Muller was able to effectively communicate her information through simplified English, clear PowerPoint slides on dental health and dental care resources as well as through proper dental hygiene demonstrations on 3-D models of the mouth. In addition, Ms Muller was successful in obtaining dental product samples from Colgate to distribute to attendees. The success of this Dental Health info session was measured by the high interest / attendance for the event, and the outcome of several attendees actually making appointments at the dental clinic she described. As an ESOL educator for more than 27 years myself (23 at the Institute), I was very impressed with Ms Muller's presentation. In it, she demonstrated not only her understanding of the needs and challenges that refugees and immigrants face but also the kind of "information tailoring" it takes to effectively deliver relevant and comprehensible information.

Since that event, Ms Muller has continued to demonstrate her compassion and interest in improving dental health awareness and access for this underserved population. One example was her effort to ensure that our clients were aware of the free MOMOM dental health event at the Chaifetz Arena in May. She has also kept the Institute informed of the progress of the construction of the large Dental Clinic near downtown St. Louis which will be much more accessible to our students after the Institute moves to our new building that will be located just over one mile from that new clinic site in 2015. In addition, this past March, Ms Muller joined the St. Louis Mosaic project, an initiative which has as its goal to make St. Louis a more welcoming city for immigrants in order to make it the fastest growing metro area for immigration by the year 2020. Ms Muller's participation in the STL Mosaic project shows her desire to make a significant contribution not just to the profession of dentistry but also to the goal of making St. Louis health services infrastructure more effective in being more accessible to immigrants.

It has been a pleasure to work with Ms Muller since we first met in January 2014. I am grateful for the opportunities I have had to witness her expertise, hard work and dedication in action, and for the inspiration that her work has been for me personally.

With heartfelt thanks for our collaboration thus far and best wishes for Ms Muller's continued success!

Sincerely,

Anita Barker,
VP & Director of Education
International Institute of St. Louis

Appendix B

English/ Estimate of Oral Health Literacy Test_Bilingual-40 (EOHL-BL40) ID#

INSTRUCTIONS: Please circle only words, which you know and understand. Please do not guess. If you only know the word in one language, circle only the word in which language you understand it.	2nd Language

English	2nd Language	English	2nd Language
Sugar		Periodontal	
Smoking		Sealant	
Floss (noun)		Hypoplasia	
Brush teeth (verb)		Halitosis	
Pulp		Analgesia	
Fluoride		Cellulitis	
Braces		Fistula	
Genetics		Temperomandibular	
Restoration		Tooth decay	
Bruxism		Apicoectomy	
Abscess		Composite	
Extraction		Amalgam	
Denture		Sulcus	
Enamel		Plaque (Biofilm)	
Dentition		Anesthetic	
Calculus		Toothbrush	
Gingiva		Bristles	
Malocclusion		Periodontal ligament	
Incipient		Cementum	
Root canal		Implant	

Study conducted by Romana Muller RDH, MSDH (c)

The above instrument (EOHL-BL40) is a modified version of the REALD-30 word assessment test developed by Dr. Lee and colleagues (Lee, J. Y., Rozier, R. G., Lee, S. D., Bender, D., & Ruiz, R. E. [2007]). Development of a word recognition instrument to test health literacy in dentistry: the REALD-30--a brief communication. Journal of Public Health Dentistry, 67(2), 94-98.Permission to modify READ-30 for use in this study, was obtained from Dr. Lee on August 11, 2015. See copy in Appendix G of this

English/Czech Estimate of Oral Health Literacy Test_Bilingual-40 (EOHL-BL40) ID#

INSTRUCTIONS: Please circle only words, which you know and understand. Please do not guess. If you only know the word in one language, circle only the word in which language you understand it.	**Instrukce: Prosím zakrouzkujte pouze slova kterým rozumíte a znáte jejich význam. Prosím nehádejte. Jestli znáte slovo v jednom jazyce, zakrouzkujte slovo jen v tom jazyce v kterém slovo rozumíte.**

English (1)	Czech (2)	English (1)	Czech (2)
Sugar	**Cukr**	Periodontal	**Periodontální**
Smoking	**Kouření**	Sealant	**Impregnace skloviny**
Floss (noun)	**Zubní nit**	Hypoplasia	**Hyperplastická sklovina**
Brush teeth (verb)	**Čištění zubů**	Halitosis	**Ustní zápach**
Pulp	**Zubní nerv**	Analgesia	**Rajský plyn**
Fluoride	**Florid**	Cellulitis	**Celluloza**
Braces	**Rovnátka**	Fistula	**Píštel**
Genetics	**Genetika**	Temperomandibular	**Temperomandibular lární**
Restoration	**Rekonstrukce**	Tooth decay	**Zubní kaz**
Bruxism	**Skřípání zubů**	Apicoectomy	**Amputace kořínku**
Abscess	**Zánět**	Composite	**Bílá výpln**
Extraction	**Vytrhnutí**	Amalgam	**Blomba**
Denture	**Zubní protéza**	Sulcus	**Kapsa**
Enamel	**Sklovina**	Plaque (Biofilm)	**Plak**
Dentition	**Chrup**	Anesthetic	**Umrtvení zubu**
Calculus	**Zubní kámenn**	Toothbrush	**Kartáček na zuby**
Gingiva	**Dásen**	Bristles	**Stetiny**
Malocclusion	**Vada vzkusu**	Periodontal ligament	**Paradontalní vlákna**
Incipient	**Počáteční**	Cementum	**Zubní cement**
Root canal	**Kořenový kanálek**	Implant	**Implantát**

Study conducted by Romana Muller RDH, MSDH (c)

Appendix C

English/ Socio-demographic Survey and Oral Health Perceptions of Refugees ID#

Please answer the questions by filling in or circling answers/

Personal information/	1. Nationality/	→	2. Male/	Female/
	3. Age/	→	4. Number of years in USA/	
	5. Number of years in school completed in your country/			
	6. Knowledge of English/	Good/	Fair/	Poor/
	7. Dental insurance/	Yes/	No/	
	8. Medicaid/	Yes/	No/	
	9. Health insurance/	Yes/	No/	
	10. Medicare/	Yes/	No/	

Please answer the questions by filling in or circling answers/

Dental History/	1. Last dental visit /	In 2015/	2-3 years ago/	4-6 years ago/	6-10 years ago/	10 years+/	Never/
	2. Do you have yearly dental check-up/			Yes/	No/		
	3. If no, why not/	Too expensive/	No insurance/	Fear/	No access/	It is not important/	
	4. Missing teeth/	Yes/	No/ →	5. Mouth odor/	Yes/	No/	
	6. Bleeding gums/	Yes/	No/ →	7. Broken teeth/	Yes/	No/	
	8. Tooth pain/	Yes/	No/ →	9. Sensitive teeth/	Yes/	No/	
	10. Loose teeth/	Yes/	No/ →	11. Dry mouth/	Yes/	No/	

English/ Socio-demographic Survey and Oral Health Perceptions of Refugees ID#

Please answer the questions by circling answers/

Oral health practices and perceptions/	1. How many times a day do you brush teeth /	2x day/	1x day/	Sometimes/	Never/
	2. How many times a day do you clean between teeth/	2x day /	1x day/	Sometimes/	Never/
	3. Are you happy with your teeth/	Yes/	No/		
	4. Have you been educated about oral health/	Yes/	Maybe/	No/	I do not know/
	5. Have you been treated by a dental hygienist/	Yes/	Maybe/	No/	I do not know/
	6. Would you like to learn how to keep your mouth and teeth healthy/	Yes/	Maybe/	No/	I do not know/
	7. How important is oral health/	Very important/	Important/	Somewhat important/	Not important/
	8. How important is oral health to your general health/	Very important/	Important/	Somewhat important/	Not important/
	9. Are you planning to visit dental clinic within next 6 months/	Yes/	Maybe/	No/	I do not know/

English/ Czech Demographics Data Questionnaire ID#

Please answer the questions by filling in or circling answers/**Prosím vyplnte nebo zakroužkujte odpovědi**

Personal information/ Osobní informace	1. Nationality/ **Národnost?**	→	2. Male/**Muž**	Female/**Zena**			
	3. Age/ **Věk?**	→	4. Number of years in USA/**Počet let v USA?**				
	5. Number of years in school completed in your country/**Kolik let školi jste dokončil v rodné zemi?**						
	6. Knowledge of English/ **Vaše vědomost anglictiny?**	Poor/**Špatná**	Fair/**Přijatelná**	Good/**Dobrá**			
	7.Dental insurance/**Máte zubní pojistku?**	Yes/**Ano**	No/**Ne**				
	8. Medicaid/**Máte Medicaid?**	Yes/ **Ano**	No/ **Ne**				
	9. Health insurance/**Máte zdravotní pojistku?**	Yes/ **Ano**	No/ **Ne**				
	10 Medicare/**Máte Medicare?**	Yes/ **Ano**	No/ **Ne**				

Please answer the questions by filling in or circling answers/**Prosím vyplnte nebo zakroužkujte odpovědi**

Dental History/ Zubní historie	1. Last dental visit **/Poslední návštěva u zubaře?**	In 2015/ **V roce 2015**	2-3 years ago/**před 2 až 3 lety**	4-6 years ago/ **před 4 až 6 lety**	6-10 years ago/ **před 6 až 10 lety**	10 years+/ **před více než 10 lety**	Never/ **nikdy**
	2. Do you have yearly dental check-up/**Podstupujete roční prohlídky u zubaře?**			Yes/ **Ano**	No/ **Ne**		
	3. If no, why not/**Jestli ne, proč?**	Too expensive /**Moc drahé**	No insurance/**Není pojistka**	Fear/**Bojím se**	No access/**Ne mám zubaře**	It is not important/**Není to důležité**	
	4. Missing teeth/**Chybějí vám zuby?**	Yes/ **Ano**	No/ **Ne** →	5. Mouth odor/**Zápach z ust?**	Yes/ **Ano**	No/ **Ne**	
	6. Bleeding gums/**Krvacejí vám dasně?**	Yes/ **Ano**	No/ **Ne** →	7. Broken teeth/**Zlomené zuby?**	Yes/ **Ano**	No/ **Ne**	
	8. Tooth pain/**Bolest zubů?**	Yes/ **Ano**	No/**Ne** →	9. Sensitive teeth/**Citlivé zuby?**	Yes/ **Ano**	No/ **Ne**	

English/ Czech Demographics Data Questionnaire ID#

Please answer the questions by filling in or circling answers/**Prosím vyplnte nebo zakroužkujte odpovědi**

	10. Loose teeth/ **Vyklající zuby?**	Yes/ **Ano**	No/ **Ne** ➔	11. Dry mouth/**Sucho v ustech?**	Yes/ **Ano**	No/ **Ne**

Please answer the questions by filling in or circling answers/**Prosím vyplnte nebo zakroužkujte odpovědi**

Oral health practices and perceptions/ Osobni ustní hygiena a nazory	1.When do you brush your teeth/**Kdy si čistíte zuby?**	2x day/**2x denně**	1 x day/**1 x denně**	Sometimes/ **Někdy**	Never/**Nikdy**
	2. Do you clean between teeth/**Cistíte si mezi zubama?**	2x day/**2x denně**	1 x day/**1 x denně**	Sometimes/ **Někdy**	Never/**Nikdy**
	3. Are you happy with your teeth/**Jste spokojeni s kondici zubů?**	Yes/ **Ano**	No/ **Ne**		
	4. Have you been educated about oral health/**Měl jste někdy skoleni o zdraví chrupu?**	Yes/ **Ano**	Maybe/ **Možná**	No/ **Ne**	I do not know/**Nevím**
	5. Have you been treated by a dental hygienist/**Byl jste někdy ošetřen zubní hygieničkou?**	Yes/ **Ano**	Maybe/ **Možná**	No/ **Ne**	I do not know/**Nevím**
	6. Would you like to learn how to keep your mouth and teeth healthy/**Chtěl by jste mít zdravý chrup?**	Yes/ **Ano**	Maybe/ **Možná**	No/ **Ne**	I do not know/**Nevím**
	7. How important is oral health/ **Jak důležité je zdraví chrupu?**	Very important/**Velmi důležité**	Important/ **Důležité**	Somewhat important/**Docela důležité**	Not important/**Neni důležité**
	8. How important is oral health to your general health/ **Jak důležité je zdraví chrupu pro celkové zdraví?**	Very important/**Velmi důležité**	Important/ **Důležité**	Somewhat important/**Docela důležité**	Not important/**Neni důležité**
	9. Are you planning to visit dental clinic within next 6 months/**Plánujete navštívit zubaře do 6 měsíců?**	Yes/ **Ano**	Maybe/ **Možná**	No/ **Ne**	I do not know/**Nevím**

Appendix D

Lesson Plan for Refugee Oral Health Education Program

Title/ Lab or Lecture	Increasing Oral Health and Access to Dental care through Oral Health Education.					
Topic	Oral Health Education					
General Goal/ Competency	Educate refugees on oral health topics; dental terminology, preventive practices and dental care access. Collect pre- and posttest data on oral health literacy and demographics.					
Specific Instructional Objectives	Teacher Activities		Time Frame	Learner Activities	Time Frame	Resources, Materials, and Technology
1. Given a list of dental terms, identify (circle) words which participant understands, demonstrating a level of oral health literacy. 2. When presented with an image of diseased and healthy periodontium/tooth, contrast health from disease. 3. Identify various restorative procedures.	Pre-Instructional	Development of Oral Health Education Program including Preparation of Materials/Activities Handouts, study instruments and activities. Secure translation of instruments. Obtain donation of toothbrushes and toothpaste from Colgate. Secure volunteers who will help during study.	30 days	Director of education will meet with researcher prior to study to discuss accommodations, demographics of participants and proposed timeline. ESL instructors will prepare for the study by participating in an orientation meeting with the researcher. ESL instructor will inform the student about the study and distribute consent form. Researcher will present the concept and purpose of the research prior to the commencement of the study.	20 hours	Power Point presentation, printed copies of translated instruments. Researcher will meet with ESL instructors and director of education in a Lunch 'n Learn style meeting. Researcher will supply food.
4. Given a list of foods, select (sort) foods that are good for oral health and the ones that are not. 5. List preventive measures for good oral health. 6. Recall systemic diseases, which are affected by periodontal disease.	Instructional	1. Estimate of Oral Health Literacy Test 2. Demographics Data Questionnaire 3. Power Point Presentation 4. Demonstrations using tooth models. 5. Question and Answer session	180 minutes Lecture 90 minutes additional activities	Phase I, II and III participation including pre- and posttest completion of Estimate of Oral Health Literacy Test and Demographics Data form. Participation during lecture in interactive activities and post-lecture discussion.	270 minutes	Power point 1.5 minute You-tube videos, laptop computer, overhead projector, digital recorder, copies of study instruments (OHL assessment and demographics data questionnaire), tooth models, toothbrushes, toothpaste, volunteer

						assistants, ESL instructors.
		Evaluation tools (Participant evaluations)	Self-assessment, review quizzes. Pre- and posttest.	Didactic	100 minutes.	Self-assessment. Data analysis.
		Evaluation of Teaching:	Self-assessment	Verbal evaluation Of instructor and program during the Q&A session in phase III of study and immediately following study.	30 minutes	Verbal evaluation of program from study participants, ESL instructors and administrators.
	Post-Instructional	Teacher Activities Course material review Course feedback and recommendations. Data analysis. Thank you letter to director of education, ESL instructors and volunteers.	Time Frame: 30 days	Phase II and III of study. Study participants: Posttest survey completion. Discussion with researcher.	120 minutes)	Copies of posttest study instruments, volunteer assistants, ESL instructors.

Oral Health Education Presentation Power Point

Additional Tools

Schedule for Refugee Oral Health Education Program

February 8, 2016

AM session 10-11:30

1. Introductions and instructions.

2. Completion of Oral health literacy assessment (pretest)

3. Completion of demographics data survey (pretest).

3. Collection of completed forms.

February 14, 2016

AM session 10-11:30

1. Administration of Oral Health Education Presentation

2. Completion of Oral health literacy assessment – posttest #1

3. Collection of completed forms.

Topics discussed during presentation.

Tooth anatomy Plaque Periodontal disease Dental disease prevention Extractions	Oral-systemic link Oral cancer and prevention Formation of dental caries Prevention of caries Prosthodontics	Nutrition and dental disease Tooth brushing Flossing Tongue brushing Braces	Sealants Scaling and root planning Restorative treatments Root canals Available services in St. Louis

February 29, 2016

AM session 10-11:30

1. Completion of Oral health literacy assessment (posttest #2).

3. Completion of demographics data survey (posttest).

3. Collection of completed forms.

3. Discussion with researcher (question and answer session, evaluation of program)

Appendix E

INTERNATIONAL INSTITUTE
SAINT LOUIS

October 13, 2015

To Whom It May Concern,

I write on behalf of the International Institute of St. Louis in support of Romana Muller's research project entitled "Does the Inclusion of an Oral Health Educational Program Increase Oral Health Literacy of Refugees and their Access to Dental Care?"

The research project proposed will be a valuable extension of work that connected Romana Muller with the Institute in February 2014, namely, a Dental Health Informational session for the refugee and immigrant students who were attending English classes at that time. The high interest in and attendance to her session, and the positive reaction to Ms Muller's information despite lack of interpreters, were reminders again of how critical and highly desired access to dental health care and information is for the foreign-born population served at the Institute.

In support of the project, the Institute is prepared to have students in our ESOL classes participate in a study by Ms Muller. We agree to schedule time for Ms Muller to give a dental health presentation as well as to conduct pre- / post-surveys.

Sincerely,

Anita Barker,
VP & Director of Education

Cc: Anna Crosslin, President and CEO

Appendix F

Consent Letter

My name is Romana Muller. I am a graduate student at Eastern Washington University in Cheney, WA. As a part of my requirement for the Masters in Science in Dental Hygiene, I am conducting research for my thesis to investigate the affect of an oral health education program on oral health literacy and access to dental care of refugees. You will be asked questions about the meaning of dental words before and after the presentation of an educational program. Upon the completion of the study, the results will be published in my thesis document and available to participants for review.

Participation of the study is voluntary and anonymous. You will be asked to answer several questions. You do not have to answer any of these questions and you do not have to participate in this study if you do not want. Consent for the survey will be assumed by completion.

If you have any questions or concerns about this survey, please contact myself at 314-740-0928, rmuller@eagles.ewu.edu, or my thesis advisor Lisa Bilich at 509-828-1295. If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Ruth Galm, Human Protections Administrator at Eastern Washington University (509-359-7971/6567), rgalm.ewu.edu

Thank you very much for your time in participation and survey completion.

Romana Muller, RDH, BA, MSDH (c)

Appendix G

From: Lee, Jessica Y. <jessica_lee@unc.edu>
Sent: Tuesday, August 11, 2015 11:42 AM
To: Muller, Romana
Subject: RE: Permission request

Thank you for your note and interest. Yes, you have our permission. Please just use the following citation.

Lee, J. Y., Rozier, R. G., Lee, S. D., Bender, D., & Ruiz, R. E. (2007). Development of a word recognition instrument to test health literacy in dentistry: the REALD-30--a brief communication. Journal of Public Health Dentistry, 67(2), 94-98.

Thank you.

Jessica Y. Lee DDS, MPH, PhD
Chair and Demeritt Distinguished Professor
Department of Pediatric Dentistry
University of North Carolina
228 Brauer Hall
Chapel Hill, NC 27599-7450
Phone: 919-537-3955
Fax: 919-537-3950
Email: jessica_lee@unc.edu

From: Muller, Romana [mailto:rmuller@eagles.ewu.edu]
Sent: Monday, August 10, 2015 12:04 AM
To: Lee, Jessica Y. <jessica_lee@unc.edu>
Subject: Permission request

Dear Dr. Lee,

Hello, I am inquiring in regards to the research conducted on behalf of Lee J.Y., Rozier, Lee S. D., Bender and Ruiz (2007), and the *Development of a Word Recognition Instrument to Test Health literacy in Dentistry: The REALD-30-A Brief Communication,* and its relevance to my own research in oral health literacy. In addition, in regard s to research on behalf of Lee J.Y., Stucky, Rozier,Lee S. and Zeldinn (2012), and the *Oral Health Literacy Assessment: development of an oral health literacy instrument for Spanish speakers.*

I am a Masters in Science in Dental Hygiene student at Eastern Washington University, in Cheney, Washington, United States. A first chair Lisa Bilich, MSDH, dental hygiene professor within the Master's program, oversees my research. My second chair is Rebecca Stolberg, BSDH, MS, and Dental Hygiene Program Chair. My third chair is Albina Jablonka-Shariff, PhD, a research scientist at Washington University School of Medicine in St. Louis, Department of surgery. My thesis research is in regards to increasing oral health literacy of refugees.

May I request your permission to use your REALD-30 test in my research? I will be using a modified version of your test for my health literacy assessment instrument, while of course citing, referencing and crediting your original work.

If this sounds agreeable to you, please let me know your preferred reference and citation. Currently, I have:

Lee, J., Stucky, B., Rozier, G., Lee, S. D., & Zeldin, L. P. (2012). Oral health literacy assessment: development of an oral health literacy instrument for Spanish speakers. *Journal of Public Health Dentistry, 73*, 1-8.

Lee, J. Y., Rozier, R. G., Lee, S. D., Bender, D., & Ruiz, R. E. (2007). Development of a word recognition instrument to test health literacy in dentistry: the REALD-30--a brief communication. *Journal of Public Health Dentistry, 67*(2), 94-98.

Thank you so much. Please let me know if I may be of any assistance, or if you have any questions.

Romana Muller, RDH, MSDH(c)
Eastern Washington University

Curriculum Vita

Romana Muller, RDH, BA, MSDH (c)

Home Address:
2092 Saline Road
Fenton, Missouri 63026
Cell (314) 740 0928
Home: (636) 305-1545

E-Mail: rmuller@eagles.ewu.edu; romanardh@gmail.com

Graduate Education:

	MSDH (c)	Masters of Science in Dental Hygiene (candidate) Eastern Washington University Cheney, Washington

Undergraduate Education:

2005	B.A.	Bachelor of Arts in Healthcare Management. Departmental Honors. Webster University Webster Groves, Missouri

2001	A.A.S.	Associate in Applied Science in Dental Hygiene. Academic Honors. St. Louis Community College at Forest Park. St. Louis, Missouri
1997	DA	Certificate in Dental Assisting. St. Louis Community College at Forest Park. St. Louis, Missouri

Academic Appointments:

2014 to present	Adjunct Professor A.T. Still University – Missouri School of Dentistry and Oral Health. Kirksville, Missouri
2010 to 2015	Adjunct Faculty Missouri College Dental Hygiene Program Brentwood, Missouri

Professional Experiences:

June to December 2011	DH Thomas Gotsis, DDS St. Louis, Missouri

2001-2010	Dental Hygienist John Steuterman, Jr., DMD St. Louis, Missouri
2007-2008	DH Katryna Vossmeyer, DMD St. Louis, Missouri
2006-2007	DH John Mahoney, DMD St. Louis, Missouri
1998-2000	Dental Assistant Victor Clark, DDS. St. Louis, Missouri

Licensure:

2001 to present	Missouri Dental Hygiene License Missouri Board of Dental Examiners
2016 to present	Illinois Dental Hygiene License Illinois Board of Dental Examiners

Certifications:

2001 to present	Missouri Registered Dental Hygienist Local Anesthesia including Infiltration and

	Block as well as Nitrous Oxide/Oxygen Sedation
2016 to present	Illinois Registered Dental Hygienist
2014 to 2016	CPR certification
2015 to 2020	Deep Sedation/ General Anesthesia Sedation Monitoring Certification

Professional Organizations:

2014 to present	International Federation of Dental Hygienists
2001 to present	American Dental Hygienists' Association
2010 to present	American Dental Education Association

Honors and Awards:

2005	Departmental Honors, Department of Management Webster University; St. Louis, Missouri
2001	Academic Honors Saint Louis Community College; St. Louis, Missouri

Committees:

2014 to present	St. Louis Mosaic Project – Ambassador http://www.stlmosaicproject.org St. Louis, Missouri

2011	Give Kids a Smile Committee Jefferson County Community Partnership Barhart, Missouri

Community Service:

2014 to present	Oral Health Educator International Institute of St. Louis St. Louis, Missouri Volunteer & PI
2014 to present	Ambassador St. Louis Mosaic Project St. Louis, Missouri
2014	Volunteer Missouri Mission of Mercy Chavez Arena, St. Louis, Missouri
2002	Organizer Give Kids a Smile program for Jefferson County Allied College; Fenton, Missouri
2001, 2011, 2012	Volunteer Give Kids a Smile for St. Louis County SLU Dental School; St. Louis, Missouri

Teaching Responsibilities:

a. Course Participation as a Course Director

1. Dental Radiology I	Missouri College: DDH 240; 2010, 2011,2012

2. Dental Anatomy and Morphology	Missouri College: DDH 110; 2010
3. Health Prevention and Promotion in Dentistry I	Missouri College: DDH 120; 2012
4. Clinical Periodontology	Missouri College: DDH 252; 2013

b. Course Participation as a Curriculum Developer

1. Dental Assisting Module for Concepts I: MDOH590	A.T. Still University, Clinical Missouri School of Dentistry and Oral Health
2. Clinical Periodontology	Missouri College: DDH 252; 2013
3. Dental Radiology I	Missouri College: DDH 240; 2010, 2011,2012
4. Health Prevention and Promotion	Missouri College: DDH 120; 2012
5. Clinical Dental Hygiene II Lecture	Missouri College: DDH 251; 2012
6. Clinical Dental Hygiene III Lecture	Missouri College: DDH 250; 2011, 2012,2013;

c. Course Participation as an Instructor

1. Radiology Technique Concepts I: MDOH6410	A.T. Still University, Clinical Missouri School of Dentistry and Oral Health
2. Clinical Concepts II Concepts I: MDOH6400	A.T. Still University, Clinical Missouri School of Dentistry and Oral Health
3. Introduction to Clinical Concepts Concepts I: MDOH5005	A.T. Still University, Clinical Missouri School of Dentistry and Oral Health

4. Infection Control Concepts I: MDOH5910	A.T. Still University, Clinical Missouri School of Dentistry and Oral Health
5. Clinical Concepts I Concepts I: MDOH5900	A.T. Still University, Clinical Missouri School of Dentistry and Oral Health
6. Clinical Periodontology	Missouri College: DDH 252; 2013,2014
7. Dental Radiology I	Missouri College: DDH 240; 2010, 2011,2012
8. Health Prevention and Promotion I	Missouri College: DDH 120; 2012
9. Health Prevention and Promotion II	Missouri College: DDH 220; 2014
10. Preclinical Dental Hygiene Lab	Missouri College: DDH131; 2011, 2012,2013
11. Dental Materials	Missouri College: DDH230; 2010,2011,2012
12. Dental Anatomy and Morphology	Missouri College: DDH 110; 2010
13. Clinical Dental Hygiene I Lab	Missouri College: DDH 250; 2011, 2012,2013
14. Clinical Dental Hygiene II Lecture	Missouri College: DDH 251; 2012
15. Clinical Dental Hygiene II Lab	Missouri College: DDH 251; 2010,2011, 2012,2013;
16. Clinical Dental Hygiene III Lecture	Missouri College: DDH 250; 2011, 2012
17. Clinical Dental Hygiene III Lab	Missouri College: DDH 250; 2011, 2012,2013;

Student Advising/Mentoring:

2010 -20013 Student Mentoring
Missouri College
Brentwood, Missouri

A.Cain, C. Stevens, A.O'Bryan, L. Sweetman, M. Lopez, C. Schuler, M. Hanneman, G.Frost, K. Holmes, A.Phillips, M.Contreras, S.Schmidt

Continuing Education Course Presentations:

August, 2013 "Local Anesthesia Certification for the Dental Hygienist", Kornblum, K.S., **Muller, R**., Missouri College, Dental Hygiene Clinic
Brentwood, Missouri, (14 hours C.E. credit)

June, 2012 "Nitrous Oxide Conscious Sedation Certification for Dental Professionals"
Kornblum K.S., **Muller, R**., Seawell S., Brown S., Missouri College, Dental Hygiene Clinic
Brentwood, Missouri, (14 hours C.E. credit)

Professional Development

2015 CLL courses at ADHA's annual session: Educating Health Care Professional Students to work Interprofessionally; Better Perio Outcomes Through Host modulation; Special Needs, Special Care, Special Challenges with Special Rewards: Providing Dental Hygiene Services in Long-Term Care Settings; Preparing Successful Manuscript: What you need to know.

2014 CLL courses at ADHA's annual session: Transforming DH Education; Mobile learning for 21st century; Effective Strategies

	for Mentoring and Teaching Research; Cultural and Linguistic Competency Training; Using Telehealth Technologies to Improve Oral Health for Vulnerable and Underserved Populations.
2013	Advanced Dental Hygiene Practice with Lab Graduate Clinical Course (2 credits) Eastern Washington University Cheney, Washington
2011 to 2014	MaxKnowledge courses: Effective Teaching Strategies: ED101; Student Retention Methods: ED102; Student Learning & Assessment: ED103; Class Management Strategies: ED104; Instructional Planning for Student Success: ED105; Enhancing Student Learning: ED106
2001-present	Continuing Education Units Dental Hygiene Education and Practice (30 hours every 2 years)

Research Experience

2016	Thesis "Does an Oral Health Education Program Increase Oral Health Literacy and Access to Dental Care in a Refugee Population?"
2015	Teledentistry in the U.S.: a survey on the utilization of teledentistry in America. (Data collected for Missouri Dental Hygiene association)
2015	Oral Health care practices in Long-term care facilities: investigating the perceptions, motivations and practices of nursing home staff and their role in provision of oral care services to residents. (In conjunction with a project for Missouri Department of Health and Senior Services)